UNIWIDE Technologies

XtremeServer 3526

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Preface

The information in this User's Guide has been carefully reviewed and is believed to be accurate.
The vendor assumes no responsibility for any inaccuracies that may be contained in this document, makes no commitment to update or to keep current the information in this Guide, or to notify any person or organization of the updates.

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Technical Support
If a problem arises with your system and no solution can be obtained from the user's manual, please contact your place of purchase or local distributor. Alternatively, please try the following help resources for further guidance.
Visit the UNIWIDE website for FAQ, technical guide, BIOS updates, driver updates, and other information:
http://www.uniwide.com/
Contact our technical staff at: support@uniwide.com

Revision History

Revision	Revision History	Date
V1.1	Second release	December 2006

1. Introduction

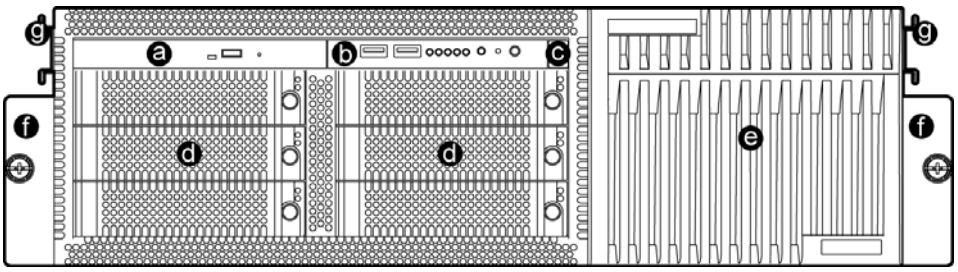
The key objective for XtremeServer is to overcome the major challenges faced by developers, and system integrators alike, in deploying ideal server solutions to the market. Although many, key challenges are identified as reliability, performance, value, scalability and manageability. XtremeServer offers the best in class for each of these challenges by employing the latest technology designed by a specialized sever team.
The XtremeServer 3526 3U Rackmount Server is a high-performance system powered by dual AMD® Opteron™ Processors, nVIDIA® nForce Professional 2200 & 2050, AMD 8132 PCI-X Tunnel chipset, ADM1026 Hardware Monitoring Chip.

In addition, 8 DIMM sockets are supported per CPU. This first-in-industry feature increases the performance/value mix by reducing the cost of system memory by up to 100% over competition.
In line with extreme processing and data buffering capability, XtremeServer is equipped with both PCI-Express and PCI-X slots and SATA II with RAID 0, 1 support. For those preferring SAS devices, 6-slot SAS with RAID option is available. Data transfer is optimized with on-board dual PCI-Express Gigabit Ethernet ports.

Server management feature is unrivaled by utilizing its dedicated BMC with IPMI 2.0 based ServerDome.
A remote management suite handles all aspects of deployment, management and monitoring of XtremeServer at an individual or aggregate level. Last but not least, XtremeServer is cable-less and tool-less integration.
This well thoughtout packaging keeps all variations of XtremeServer ultra cool and easy to maintain, thus, optimizing on reliability and TCO.

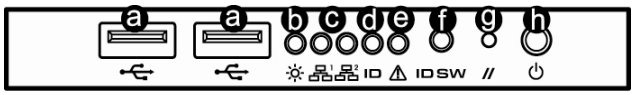
1.1 System Feature

1.1.1 Front View



a. Slim CD-ROM Drive
b. Front Panel Controls and Indicators
c. FDD Ejector button
d. Hard Disk Drive
e. Front Bezel
f. Mounting Bracket
g. Bracket Slide Inner

1.1.2 Front Panel Controls and Indicators

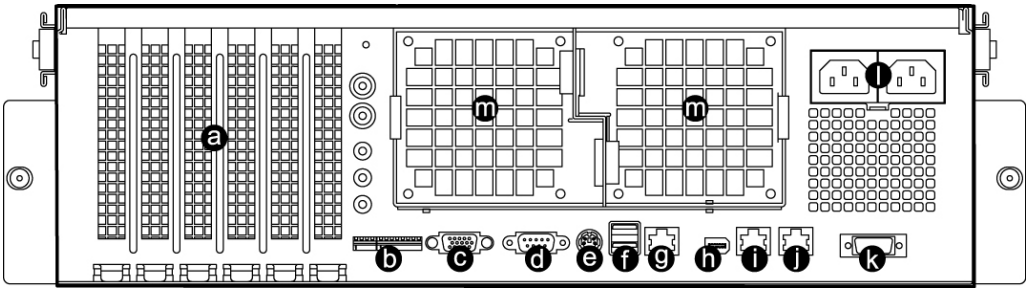


a. USB 2,0 Ports
b. Power LED
c. LAN Activity LED
d. System ID LED
e. System Fault LED
f. System ID Switch
g. Reset Switch
h. Power ON/OFF Switch

Front Side LEDs

LED	Color	State	Description
System Power	Blue	On	System is turned on
	Off	Off	Power is off
LAN1/LAN2 Activity	Green	Blink	Network is linked and accessed
	Green	Off	No LAN access
System ID	White	On	Identification is active by management software or ID LED button
	Off	Off	Identification is not active
System Fault	Off	Off	Running/normal operation
	Red	On	Critical or non-recoverable condition
HDD Status	Green	On	HDD exists and is powered
	Off	Off	No HDD
HDD Activity/Fail	Green	Blink	Disk is accessed
	Red	Blink	Disk has problem or on Rebuilding
	Off	Off	No disk activity

1.1.3 Rear View

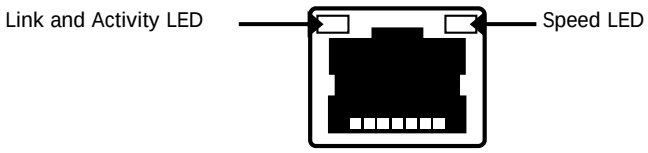


a. PCI Slots
b. System Geographical ID Switch
c. VGA Port
d. Serial Port
e. PS/2 Port(Keyboard & Mouse)
f. USB 2.0 Ports
g. KVM over IP
h. IEEE 1394 Port
i. GbE LAN Port(IPMI)
j. GbE LAN Port
k. External SAS Port
l. AC Power Inlet
m. Rear Fan

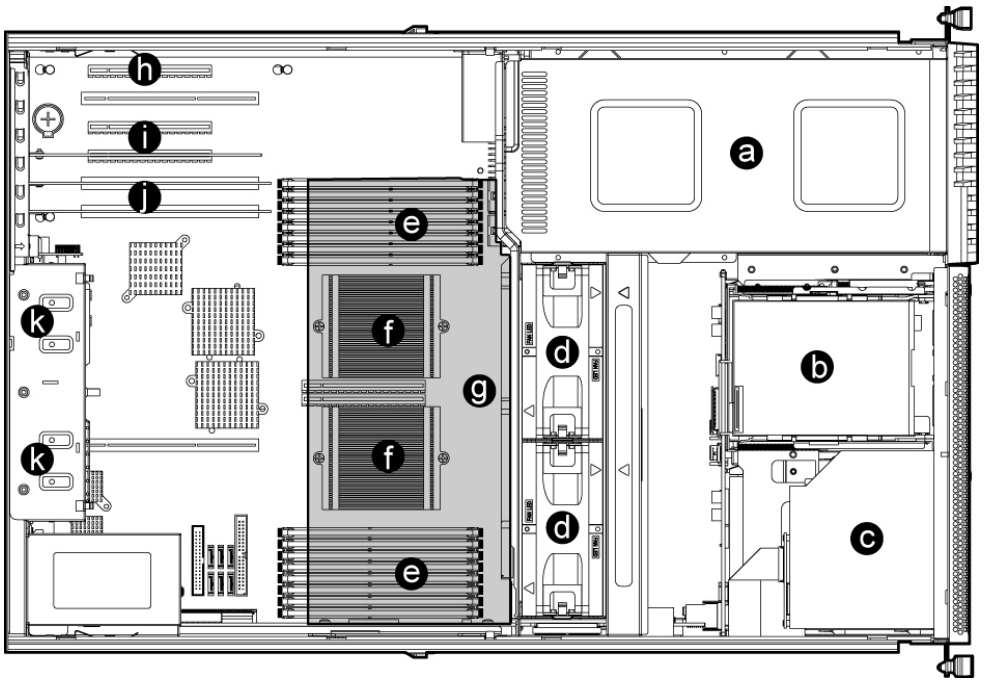
LAN Port Function

The LAN port uses a CAT 6 LAN cable for connecting the motherboard to a local area network by means of a network hub. The port has 2 indicator LEDs.

LED	Color	State	Description
Link and Activity	Green	Blink	LAN is linked and accessed
	Off	Off	LAN is not linked
Speed	Orange	On	Gigabit mode access
	Green	On	100M mode access
	Off	Off	10M mode access

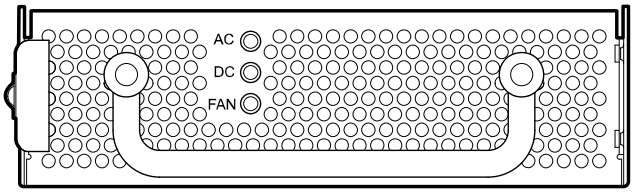


1.1.4 Inner View



a. Power Supply
b. Silm FDD
c. Silm CD-ROM
d. Center Fan
e. Memory DIMM Slots
f. HeatSink
g. CPU/Memory Duct
h. PCI-Express Add-on Card(Option)
i. PCI-Express Add-on Cards
j. PCI-X Add-on Cards
k. Rear Fan

1.1.5 Power LED Indication



AC : Green – Normal / Yellow - Fail

DC : Green – Normal / Yellow – Fail

FAN : Green – Normal / Yellow - Fail

NOTICE

You can check the power status LED after the front bezel is removed.

1.2 System Specifications

Processor

Four socket F(1207pin) AMD Opteron™ Processors

Supports up to 2P/4C Dual-Core AMD Opteron™ 8000 Series processors

Integrated 128bit DDR-2 memory controller

Chipset

NVIDIA® nForce™ Professional 2200

AMD-8132TM PCI-X 2.0 Tunnel

NVIDIA® nForce™ Professional 2050 (3526VA-01)

Winbond Super I/O chip

Analog Devices® hardware monitoring chip

Memory

128-bit dual channel memory bus

Eight DIMMs per CPU, up to 128GB memory capacity

Registered ECC DDR2 400/533/667 SDRAM DIMM

SATA Controller (3526VA-01)

Integrated nForce™ Professional 2200 and 2050

Six ports supporting RAID 0, 1, 10, 5 (Mediashield, Windows)

SAS Controller (3526ES-01)

LSILogic LSI1068X 8-ch SAS controller

4-CH shared with External SAS port

LSILogic Integrated RAID & ZCR support

IDE Controller

Integrated nForce™ Professional 2200

One port for CD-ROM Drive

2.5" HDD (Optional)

Drive Bays

Supports six hot-swap SATA HDD (3526VA-01)

Supports six hot-swap 3.0 SAS HDD (3526ES-01)

Supports Slim CD-ROM and Slim FDD Drive

Expansion Slots

Two x16 PCI-Express slot supporting full-length add-on card

One x4 PCI-Express slot supporting half-length add-on card

Two 64bit 133/100/66MHz PCI-X slot supporting half-length add-on card

One 64bit 133/100/66MHz PCI-X slot supporting full-length add-on card

Integrated I/O

Rear I/O

One VGA port

One serial port

One PS/2 keyboard & mouse port

Two USB 2.0 ports

Two RJ45 GbE ports

One IEEE-1394a (Firewire) port

One external SAS connector (3526ES-01)

Front LED Panel

Two USB 2.0 ports

LEDs: Power / GbE LAN1 / GbE LAN2 / ID / System Fault

Switches: System ID / Reset / Power

System Management

FAN connectors

For CPU / System - Two step speed control

Port 80h 7 segment display

BMC

Supports IPMI 2.0 specification

Auto fan speed control

Voltage and fan speed monitoring

LAN Controller

Two Broadcom® BCM5721 PCI-Express gigabit ethernet controllers

Support PXE function

Video Controller

XGI Volari Z9 /16MB

BIOS

AMI BIOS

Support ACPI 2.0 with S0/S1/S3/S4 and S5

Support AMD PowerNow!

48-bit LBA support

Support USB K/B & Mouse

Serial Console Redirection

Support USB boot and PXE boot in boot sequence

Support serial over LAN function

Power Supply

1000W(2+1) hot-swap redundant Power Supply with PFC function

AC Input: 100-240V~, 50/60Hz, 12.4-6.2A

Form Factor

3U (H x W x D): 131 x 430 x 698 mm (5.2 x 16.9 x 27.5 inch)

Regulatory

CE(EMC) : EN55022(EMI), EN55024(EMS), EN61000-3-2(Harmonic), EN61000-3-3(Flicker)

CE(LVD) : EN60950

CB : IEC 60950

FCC : FCC 15 Subpart A

UL : UL 60950

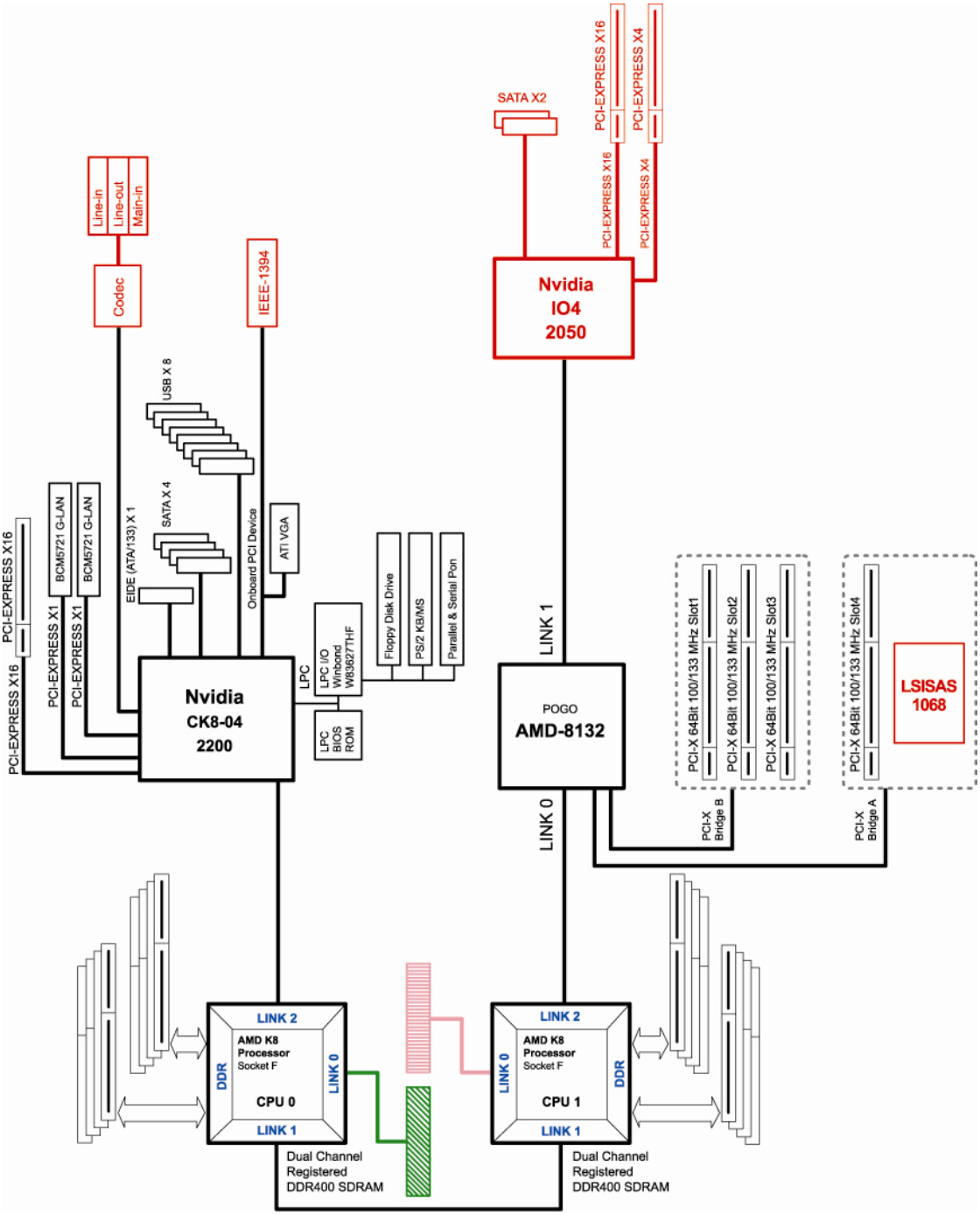
MIC : KN22(EMI), KN24(EMS)

ROHS

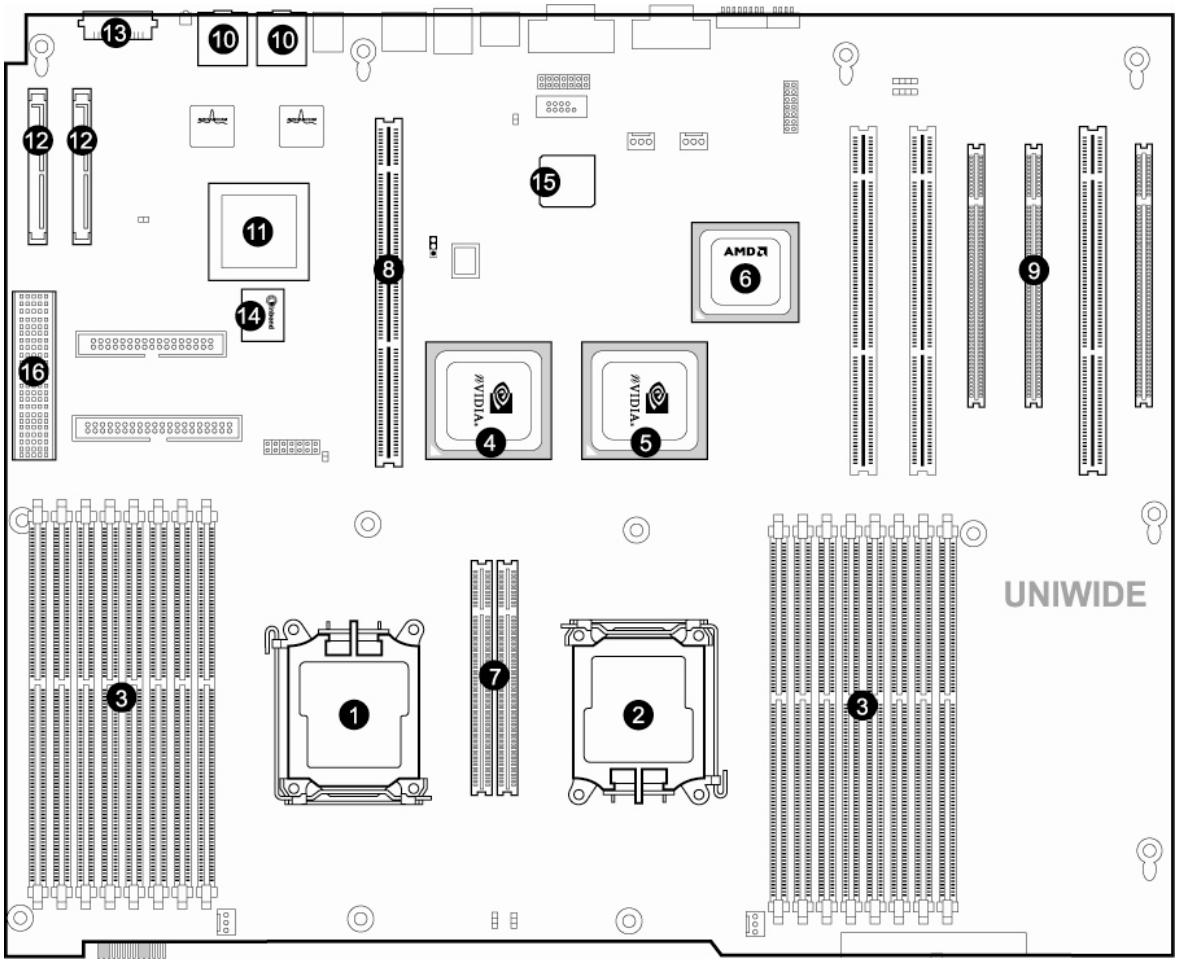
WEEE

1.3 Mainboard Layout

1.3.1 Block Diagram



1.3.2 Mainboard Layout



① AMD® Opteron™ Socket 1207 - CPU0

② AMD® Opteron™ Socket 1207 - CPU1

③ Registered ECC DDR memory Slots

④ NVIDIA nForce™ Professional 2200

⑤ NVIDIA nForce™ Professional 2050

⑥ AMD® 8132 PCI-X 2.0 Tunnel

⑦ HT Connector

⑧ PCI-X slot (supports ZCR)

⑨ PCI Express x16 Slot

⑩ Two Broadcom® PCI Express GbE ports

⑪ LSILogic LSI1068X 8-ch SAS controller

⑫ 32pin SAS Connector

⑬ External SAS Connector

⑭ Winbond 83627THF LPC Super I/O

⑮ XGI Volari Z9

⑯ Interface Connector

2. Important Safety

Only a technically qualified person shall access, integrate, configure, and service this product.

To avoid personal injury or property damage, read, observe, and adhere to all of the following safety instructions and information before you begin installing the product.

2.1 Intended Application Uses

This product was evaluated as information technology equipment (ITE), which may be installed in offices, schools, computer rooms, and similar commercial type locations. The suitability of this product for other product categories and environment (such as medial, industrial, alarm systems, and test equipment), other than an ITE application, may require further evaluation.

2.2 Checking the Power Cord

CAUTION

To avoid electrical shock, check the power cord(s) that will be used with the product:
Do not attempt to modify or use the AC power cord(s) if they are not the exact type required.
If a power cord is not compatible with the AC wall outlet in your region, get one that meets the following criteria:

- The power cord must be properly rated for the AC voltage in your region.
- The power cord plug cap must have an electrical current rating that is at least 125% of the electrical current rating of the product.
- The power cord plug cap that plugs into the wall socket-outlet must have a grounding type male plug designed for use in your region.
- The power cord must have safety certifications for your region, and shall be marked with the certification markings.
- The power cord plug cap that plugs into the AC receptacle on the power supply must be an IEC 320, sheet C13, type female connector.
- In Europe, the power cord must be less than 4.5 meters (14.76 feet) long, and it must be flexible <HAR> (harmonized) or VDE certified cordage to comply with the chassis' safety certification

The power supply cord(s) is the main disconnect device to AC power.

The socket outlet(s) shall be near the equipment and shall be readily accessible for disconnection.

2.3 Multiple Power Sources

Where a unit receives power from more than one source (for example, different voltages or frequencies or as backup power), there shall be a prominent marking at each disconnect device giving adequate instructions for the removal of all power from the unit.

2.4 Earth-Grounded Socket Outlets

CAUTION

To avoid electrical shock, the system power cord(s) must be plugged into socket-outlet(s) that is provided with a suitable earth ground. The system will be provided with the following marking:

- Connect only to properly earthed socket outlet.

2.5 Before Removing the Access Covers

CAUTION

To avoid personal injury or property damage, the following safety instructions apply whenever accessing inside the product:

- Turn off all peripheral devices connected to this product.
- Turn off the system by pressing the power button on the front of the product.
- Disconnect the AC power by unplugging all AC power cords from the system or wall outlet.
- Disconnect all cables and telecommunication lines that are connected to the system.
- Retain all screws or other fasteners when removing access cover(s). Upon completion of accessing inside the product, refasten access cover with original screws or fasteners.
- Do not access inside power supply. There are no serviceable parts in the power supply.
- Return to manufacturer for servicing.

2.6 Fans

CAUTION

To avoid injury, do not contact moving fan blades.

2.7 Electrostatic Discharge (ESD)

CAUTION

Perform the procedures in this product guide only at an electrostatic discharge (ESD) workstation, because the server components can be extremely sensitive to ESD. If no such station is available, you can reduce the risk of electrostatic discharge ESD damage by doing the following.

- Wear an antistatic wrist strap and attach it to a metal part of the server.
- Touch the metal on the server chassis before touching the server components.
- Keep part of your body in contact with the metal server chassis to dissipate the static charge while handling the components.
- Avoid moving around unnecessarily.
- Hold the server components (especially boards) only by the edges.
- Place the server components on a grounded, static-free surface.
- Use a conductive foam pad if available but not the component wrapper.
- Do not slide the components over any surface.

2.8 Cooling and Airflow

CAUTION

For proper cooling and airflow, always install all access covers before turning on the system.
Operating the system for longer than five minutes without the covers in place can cause overheating and damage to system components.

2.9 Battery

CAUTION

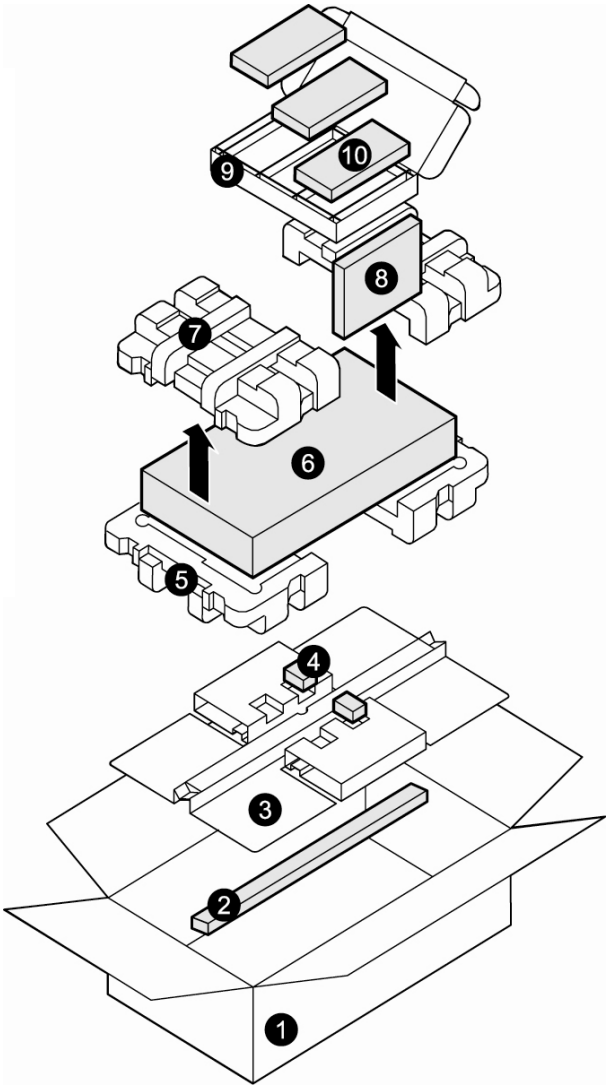
Risk of explosion if battery is replaced by an incorrect type.
Dispose of used batteries according to the instructions.

3. System Installation

3.1 Preparing for Setup

3.1.1 Unpacking

① Main Box
② Slide Rail Box
③ Heatsink Pad
④ Heatsink Box
⑤ System Bottom Cushion
⑥ XtremeServer 3526 System
⑦ System Top Cushion
⑧ Accessory Box
⑨ PSU Box
⑩ Power Supply Unit



CAUTION

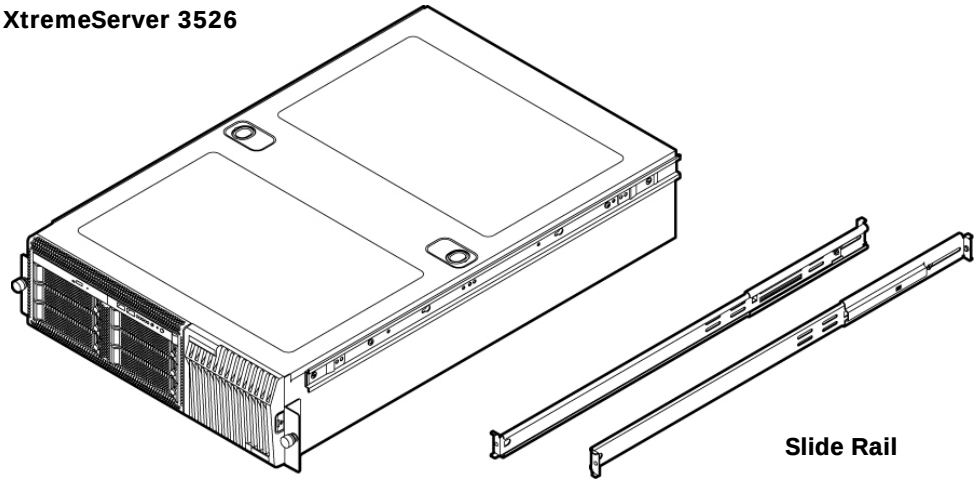
In setting the product out of the box, hold it in the middle and not the cushion. Depending on the weight of the product, two people together should lift it.

3.1.2 Packing List

Unpack the package and check if all items listed below are present.

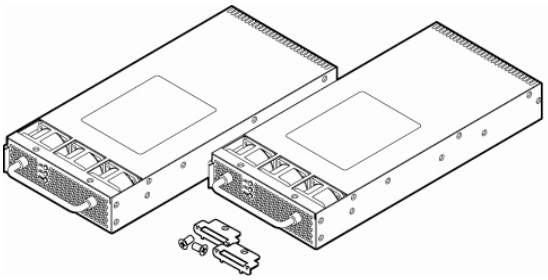
If any item contained in the package is damaged or missing, please contact your local dealer for replacement. In addition, keep the box and packing materials for possible future use.

XtremeServer 3526

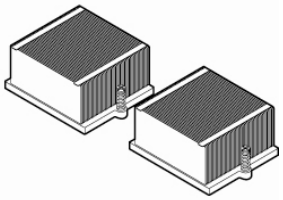


Slide Rail

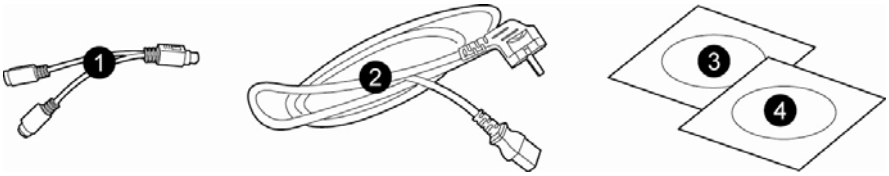
Power Supply



CPU Heatsink



Accessory Box



① PS/2 Y-Cable

② Power Code(Optional)

③ Manual and Driver CD

④ ServerDome(Optional)

3.1.3 Environmental Specifications

Place

In front of the system, minimum 25" of the space is needed for using and managing the system.

In rear of the system, minimum 30" of the space is needed for managing the system and airflow.

Power supply

Before installing the system, check the power capacity of the place where the system is installed.

Grounding

The system should be grounded.

Temperature

The system should be installed where the airflow and temperature is proper.

If the system is installed in the rack, the temperature in rack should be less than 35 degree Celsius.

In most case, the temperature of the rack is higher than that of the out of the rack.

Airflow

Since the airflow of the system is front-to-rear, please do not cover of the system

3.1.4 Install Rail for Mounting the System on the Rack

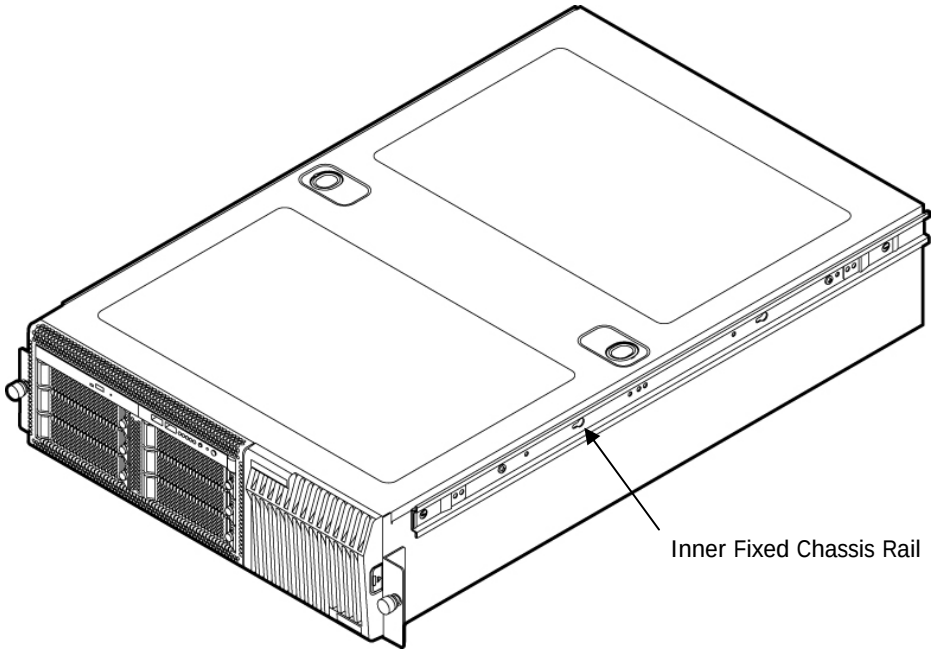
This section provides information on installing the system into a rack unit with the slide rails provided.

Slide Rail

Slide rails consist of two sections: an inner fixed chassis rail that secures directly to the server chassis and an outer fixed slide rail that secures directly to the rack itself.

You should have received outer slide rails in the rack mounting kit.

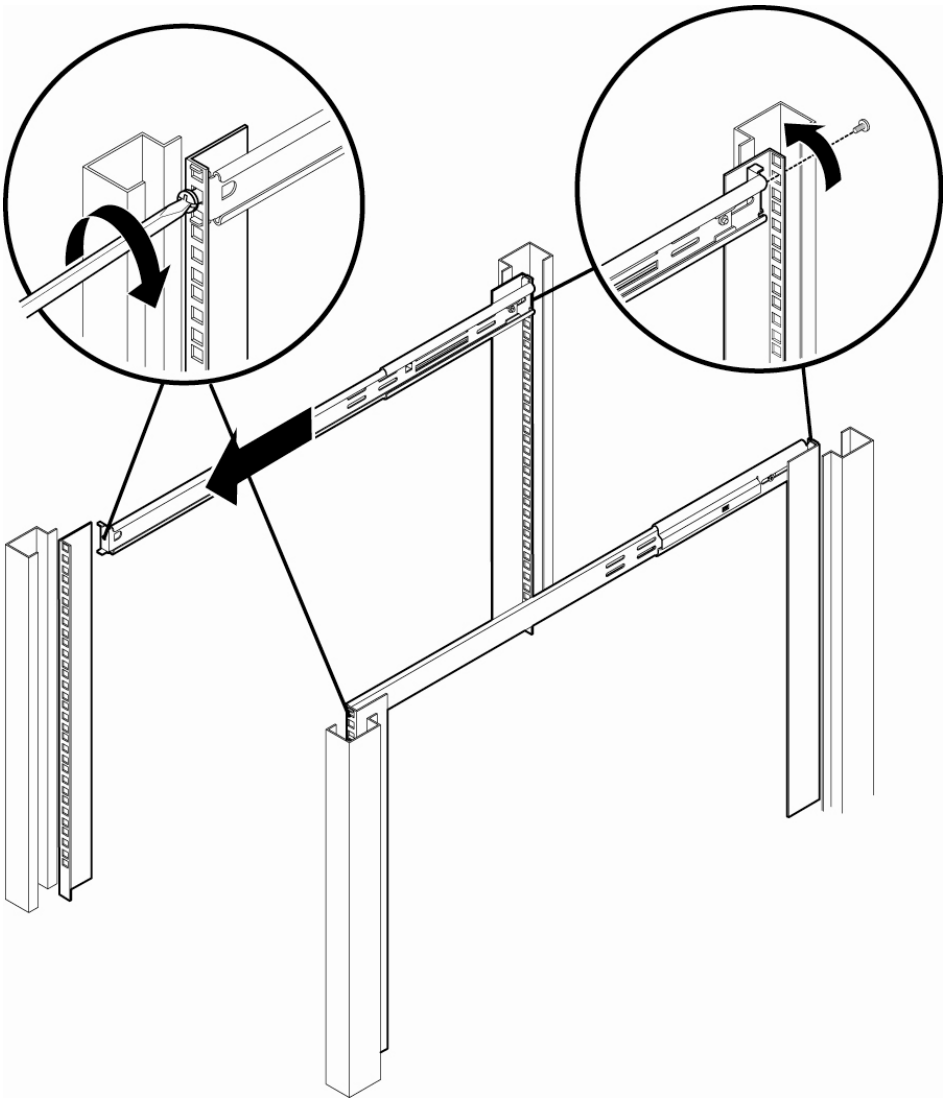
(See packing list) And, both the left and right side inner rails have been pre-attached to the chassis.



Installing the Outer Rails

As shown in picture below, put the rear of outer rail on right place of the rear-mounting frame, and fit it on the front-mounting frame.

You can fit the outer rails on the rack very easily and then eventually you can reduce the assembly time. Finally, secure it with M6 screws.



3.1.5 Install System at the Rack Cabinet

CAUTION

Remove all the cables from system before installing.

CAUTION

System can be heavy. To reduce the risk of personal injury or damage to the equipment, get help to lift and stabilize the system during installation or removal, especially when the system is not fastened to the rails.

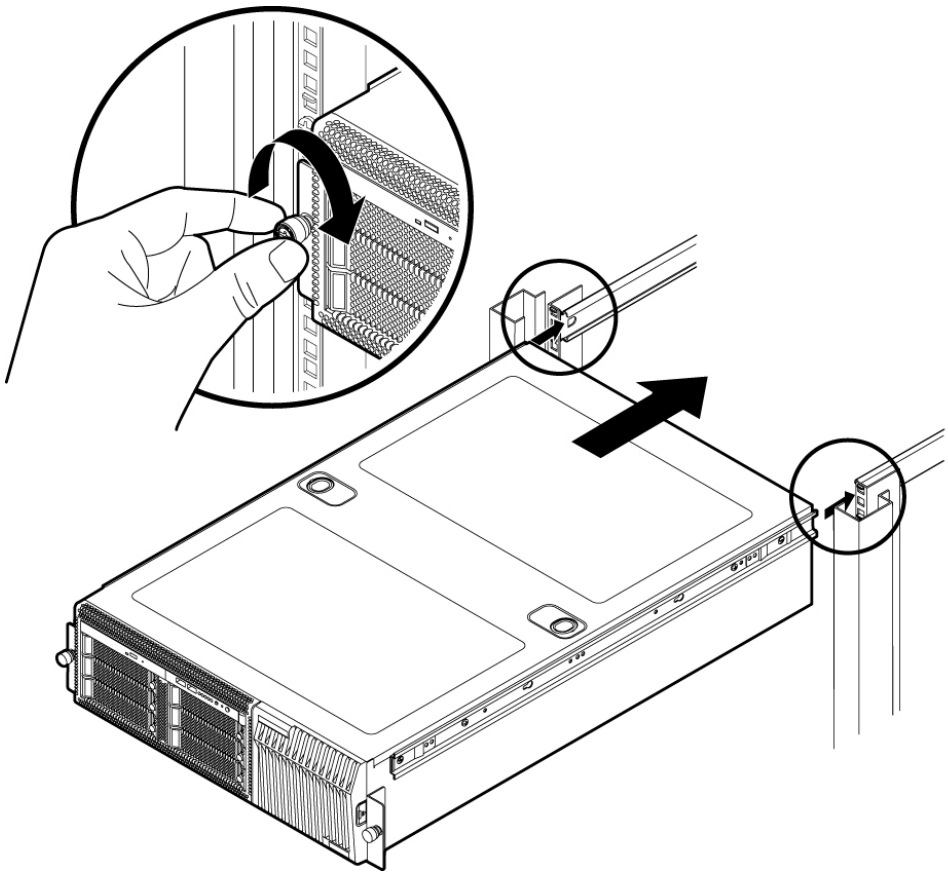
① Lift the system to slide of rack

② Set the system on the slide rail of rack

③ Slide the system into the rack

④ Secure the system with thumbscrew on the rack.

⑤ Pull it out, pressing both levers on the inner slide rails simultaneously



3.2 Installing User Serviceable Component

3.2.1 CPU

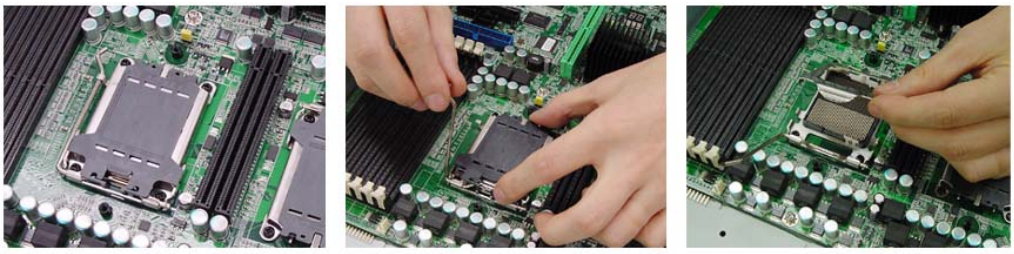
System mainboard accommodates Socket-F(1207 pin) AMD Opteron™ Processors at 2000 MT (Mega Transfer per second). You must insert a CPU into CPU socket 0 (CPU0) first before installing one in CPU socket 1 (CPU1). The correct CPU installation sequence is CPU0, CPU1.

CAUTION

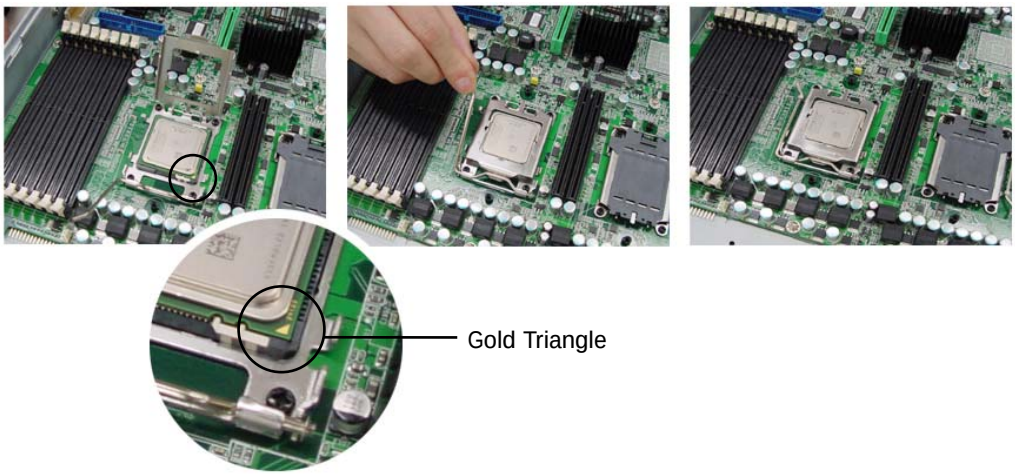
If you are using 3546VA-01, 3546ES-01 model, you must surely use two or four CPU for appropriate operation.

Follow these instructions to install the CPU.

① The socket-locking lever must be raised (Pull out slightly, and then lift up).



② Locate the pin 1 of the CPU socket and pin 1 of the CPU. (Marked by a triangular hole in the Pin 1 corner) Lower the locking lever and latching it into the fully locked position.



3.2.2 Memory

The system mainboard uses Dual Inline Memory Modules (DIMM). Two pair's banks are available; each bank supports one CPU with Hyper Transport Technology. The memory DIMMs accommodates Registered ECC (400/533/667) SDRAM DIMM and Double Data Rate Memory (DDR2) memory modules in 128MB, 256MB, 512MB, 1GB, and 2GB, 4GB combinations. Total memory size for one CPU is up to 32GB.

CAUTION

The system mainboard has strict memory type and timing requirements.
Before you purchase DDR (Double Data Rate) memory for using in the system mainboard, you should contact your local reseller for a recommend list of system memory that has been validated on this system. It only supports registered memory, not supports unbuffered type memory.

CAUTION

To take advantage of the 128-bit interface, you must install DIMMs in pairs of two. DIMM0 and DIMM1 are paired; DIMM2 and DIMM3 are paired; DIMM4 and DIMM5 are paired; and slots DIMM6 and DIMM7 are paired. If you are only installing two DIMMs into a Memory Bank, it is recommended that you install them in slots DIMM6 and DIMM7 to get the full bandwidth.

NOTE

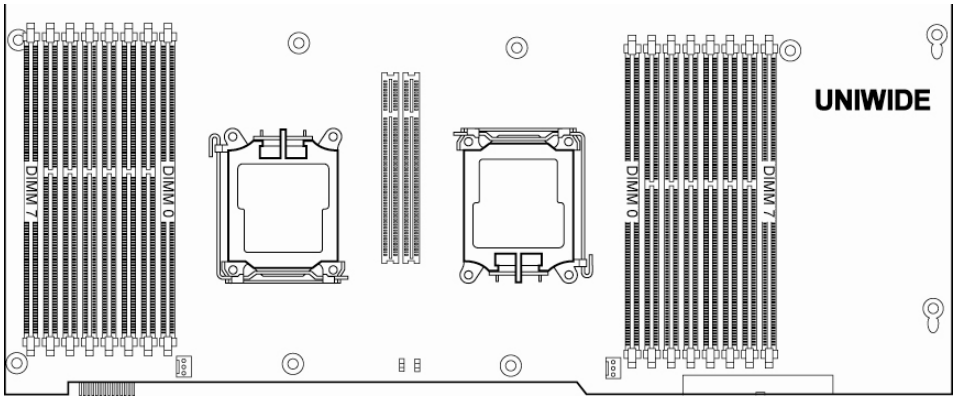
For optimal dual-channel DDR operation, installing DIMMs in pair is highly recommended. For two DIMMs per CPU, install them far from the CPU. For four or more DIMMs per CPU, install them same method to the CPU.

Memory Configuration Chart
(Note: X indicates a populated DIMM Slot, The chart below does not included all the configuration)

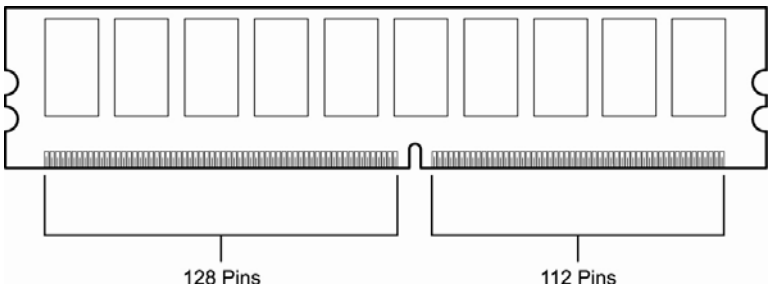
	CPU 0								CPU 1							
	DIMM0	DIMM1	DIMM2	DIMM3	DIMM4	DIMM5	DIMM6	DIMM7	DIMM0	DIMM1	DIMM2	DIMM3	DIMM4	DIMM5	DIMM6	DIMM7
128bit memory support							x	x								
					x	x	x	x								
			x	x	x	x	x	x								
	x	x	x	x	x	x	x	x								
							x	x							x	x
					x	x	x	x					x	x	x	x
			x	x	x	x	x	x			x	x	x	x	x	x
	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

Memory Installation Procedure

① Locate the DIMM modules.



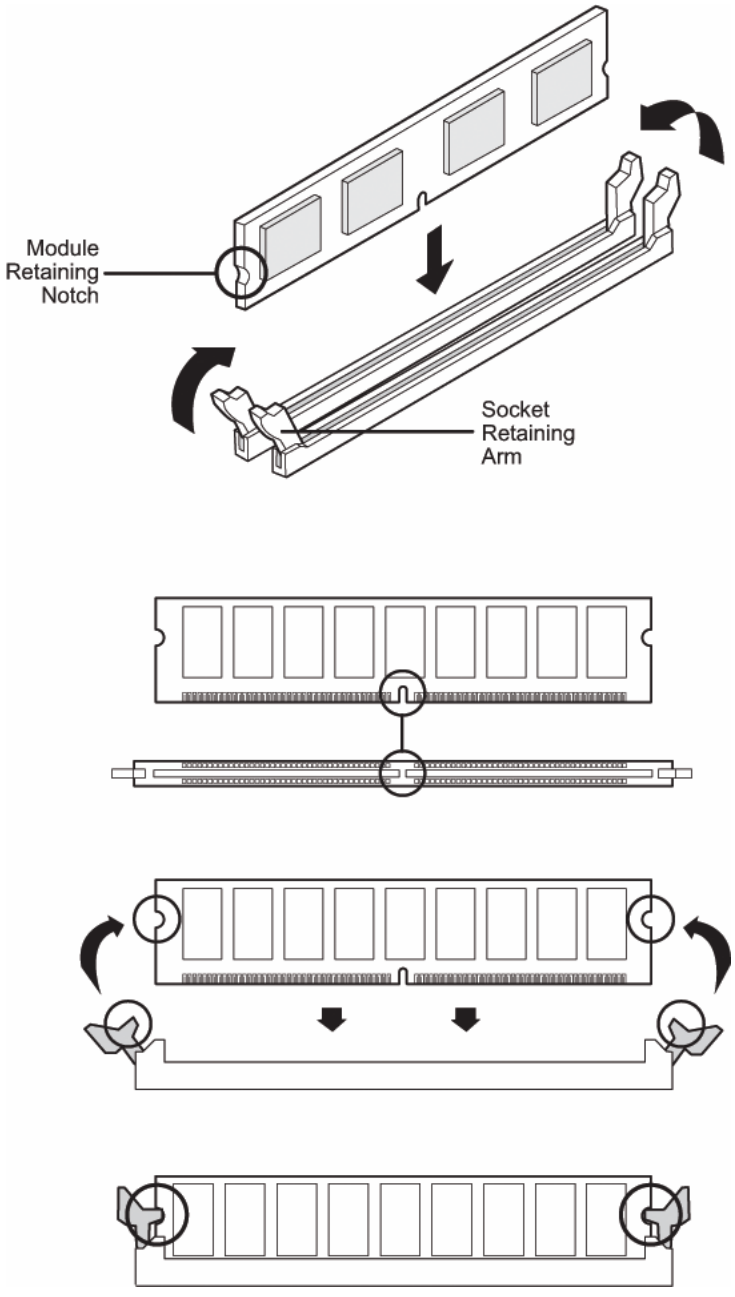
② Make sure the DIMM's pins are facing down, and check that the pin arrangement on the memory module resembles the one pictured below.



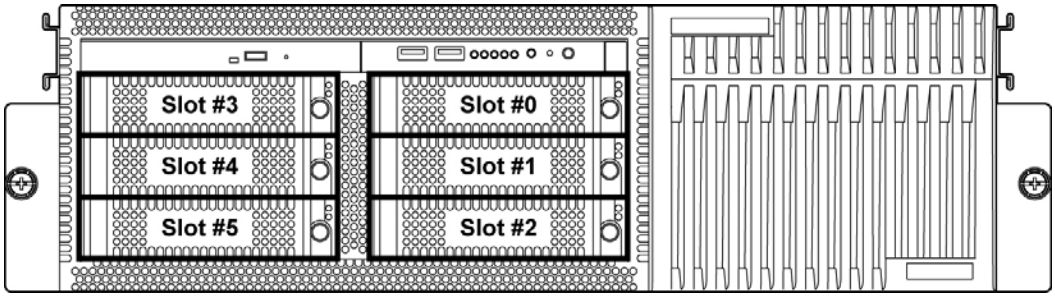
CAUTION

Always populate H0 DIMM socket before installing memory modules in the H1 DIMM sockets.

③ Insert the module into the DIMM socket and press down evenly on both ends firmly until the DIMM module is securely in place. (The tabs of the DIMM socket will close-up to hold the DIMM in place when the DIMM is properly installed into the socket.)


Module
Retaining
Notch
Socket
Retaining
Arm

3.2.3 Hard Disk Drives



HDD ID Configuration

HDD Type	Slot #5	Slot #4	Slot #3	Slot #2	Slot #1	Slot #0
SATA	ID 6	ID 5	ID 4	ID 3	ID 2	ID 1
SAS(SCSI)	ID 5	ID 4	ID 3	ID 2	ID 1	ID 0

NOTICE

When you install hard disk drive into the system, we recommend using slot #0 first.

3.2.4 PCI Add-on Cards

WARNING

Please power off your power supply completely when adding removing any expansion card or other system components. Failure to do so may cause severe damage to both your motherboard and expansion card.

WARNING

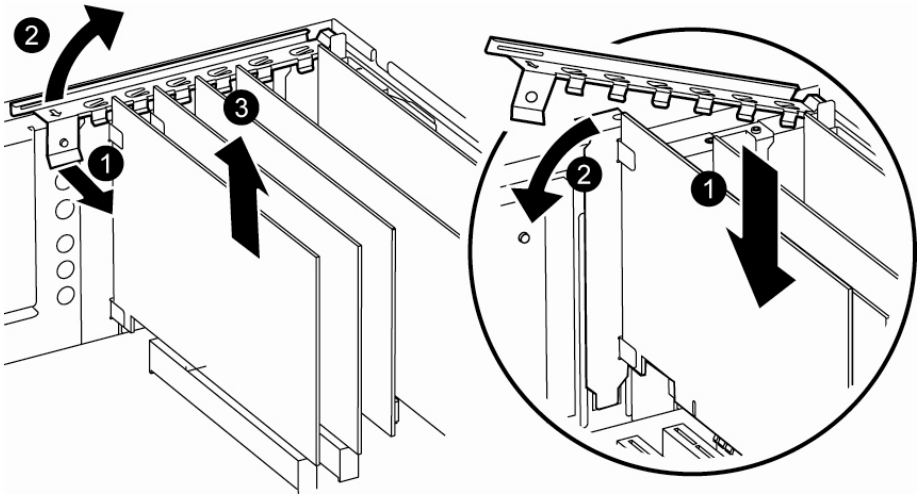
Please again check add-on card type when adding expansion card to slot.
PCI-X slot can't support exclusive 5V add-on card.

3.2.4.1 Expansion Card Installation Procedure

① Release the latch by pulling towards the front and rotate it.

② Install PCI card to the system.

③ Rotate the latch back into the original position to lock.



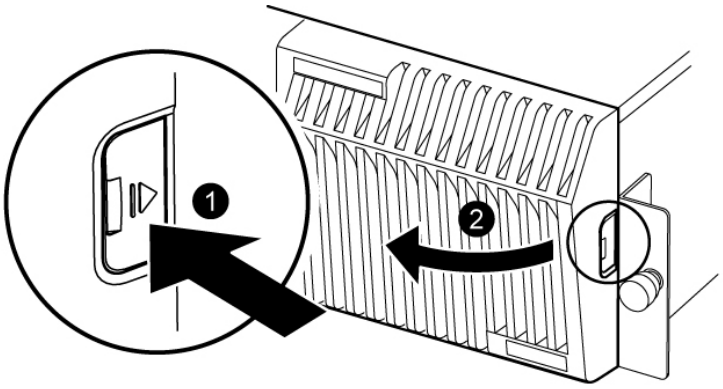
3.2.5 Power Module Hot Plugging

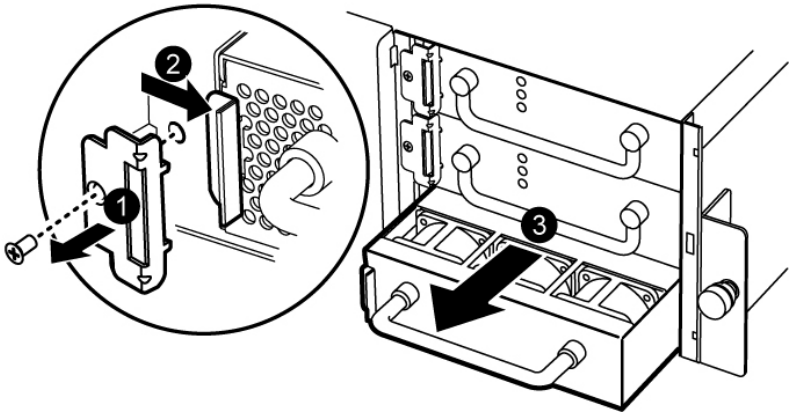
WARNING

If removing a power supply, release the locking latch of the power supply.

① Press the release button on the side of the front bezel, and take the bezel away from the system.

② Release the latch hook and pull the power supply out of the system.





4. BIOS and Jumper Setting

4.1 BIOS

This chapter discusses the AMI BIOS Setup program built into the ROM BIOS. The Setup program allows users modifying the basic system configurations according to their requirements. This special information is then stored in battery-backed RAM so that it retains the Setup information when the power is turned off.

The AMI BIOS installed in your computer system's ROM (Read Only Memory) is a custom version of an industry standard BIOS. The BIOS provides critical low-level support for standard devices such as disk drives and serial ports. The AMI BIOS has been customized by adding important, but non-standard, features such as password protection as well as special support for detailed fine-tuning of the chipset controlling the entire system.

The rest of this chapter is intended to guide you through the process of configuring your system using Setup.

4.1.1 Starting BIOS Setup

The AMI BIOS is immediately activated when you power on the computer every time.

The BIOS reads the system information contained in the CMOS and begins the process of checking out the system and configuring it. After finishing configuring the whole system, then BIOS will continue to seek an operating system on one of the disks, launch then turn control over to the operating system.

While the AMI BIOS is in control, the Setup program can be activated in the way:

By pressing the <DEL> key when the following message appears briefly at the bottom of the screen during the POST (Power On Self-Test).

4.1.2 Updating BIOS Setup

Creating a bootable floppy disk

A. DOS environment
Insert a 1.44 MB floppy disk into the drive.
At the DOS prompt, type:
format A : /S then press <Enter>.

B. Microsoft® Windows® environment(Microsoft® Windows® 95/98 only)
Insert a 1.44 MB floppy disk into the floppy disk drive.
From your Windows desktop, click on Start, then select My Computer.
Select the 3 1/2 Floppy Drive icon.
Click File from the menu, and then select Format. A Format 3 1/2 Floppy Disk window appears.
If you are using Windows™, select "Create an MS-DOS startup disk" from the format options field, then click Start.

Move the latest BIOS file to the bootable floppy disk.

Using *"AFUDOS.EXE"* to update the BIOS

Update the BIOS using the AFUDOS.EXE utility in DOS environment.
At the DOS prompt, type the command line:
AFUDOS <filename>
where "filename" means the latest (or original) BIOS file that you copied to the bootable floppy disk.
The screen displays the status of the update process.

NOTICE

The BIOS information on the screen is for reference only.
What you see on your screen may not be exactly the same as shown.

CAUTION

DO NOT shutdown or reset the system while updating the BIOS! Doing so may cause system boot failure!

When the BIOS update process is complete, the utility returns to the DOS prompt.

The AMI BIOS is immediately activated when you power on the computer every time. The BIOS reads the system information contained in the CMOS and begins the process of checking
out the system and configuring it. After finishing configuring the whole system, then BIOS will continue to seek an operating system on one of the disks, launch then turn control over to the operating system.

While the AMI BIOS is in control, the Setup program can be activated in the way:

By pressing the <DEL> key when the following message appears briefly at the bottom of the screen during the POST (Power On Self-Test).

Press <DEL> to enter SETUP

4.1.3 Using Setup

In general, you use the arrow keys to highlight items, press <Enter> to select, press <Esc> to quit. The following table provides more details about how to navigate in the Setup program using the keyboard.

Key	Function
Up Arrow(↑) Key	Move to the previous item
Down Arrow(↓) Key	Move to the next item
Left Arrow(→) Key	Move to the previous item
Right Arrow(←) Key	Move to the next item
Esc key	In the Submenu: Exit the submenu. In the BIOS main category: Quit Without saving changes.
Enter Key	Select the item. A pop-up selection will display on the screen to set the item value.
PgUp Key	Previous page on Scrollable menus or jump to the first interactive item listed.
PgDn Key	Next page on Scrollable menus or jump to the last interactive item listed
F1 Key	General Help on Setup navigation keys. Press <F1> key to pop up a small help window that describes the appropriate keys to use and the possible selections for the highlighted item. To exit the Help Window, press<ESC> key or <F1> key again.
F2/F3 Key	Change colors
F7 Key	Discard changes
F8 Key	Load failsafe defaults
F9 Key	Load optimal defaults
F10 Key	Save and Exit
Home	Go to top of screen
End	Go to bottom of screen
Esc	Exit

NOTICE

The BIOS does NOT automatically save values that you have modified. If you do not save your values before you exit the BIOS Setup Utility, all your changes will be lost.
If after making and saving system changes with the BIOS Setup Utility, you discover that your computer is no longer able to boot, the AMI BIOS supports an override, which will reset your system to the Failsafe defaults. If that fails, it is possible to manually clear the present CMOS information through the "Clear CMOS Header" on the motherboard (Refer to Jumper Settings for more information).
The best advice is to ONLY alter settings which you thoroughly understand. The default settings have been carefully chosen by AMIBIOS to provide the maximum system performance and reliability.
Even a slight change to the chipset setup may cause potential and unpredictable failure to the system.

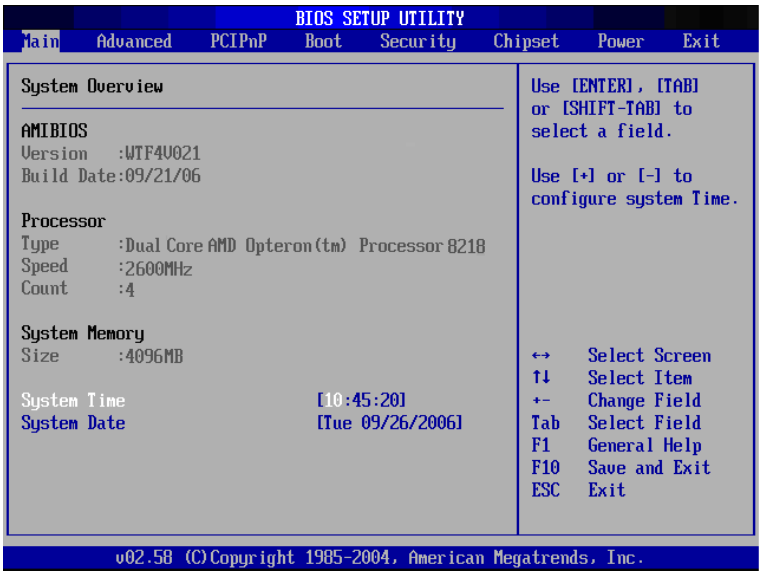
4.1.4 Main Menu

This is the first screen that is displayed when you enter the BIOS Setup Utility.

Each tab lined on the top of the screen represents each different menu. The following picture shows the main menu.

Main menu shows the information of BIOS version, date and ID; processor type, speed and count; system size.

In addition, system time and date is adjustable using + / - key or number keys.

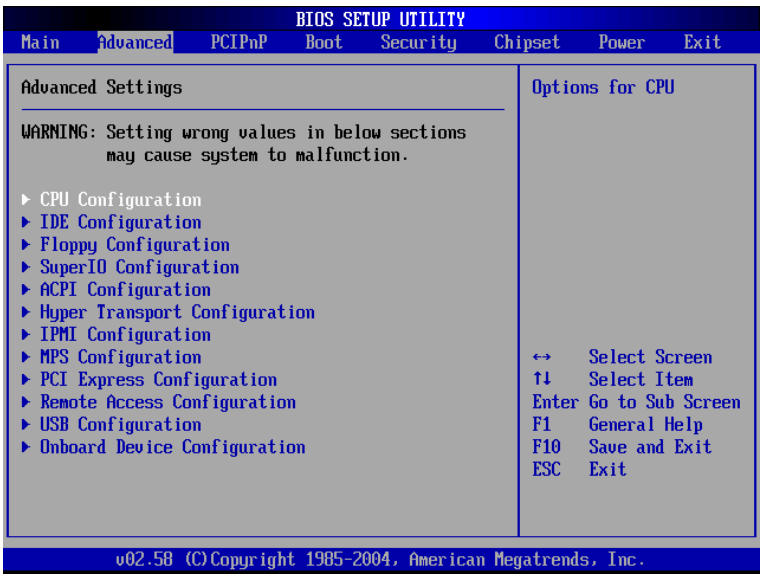


NOTICE

You can check the BMC F/W version on the post and in the BIOS setup utility

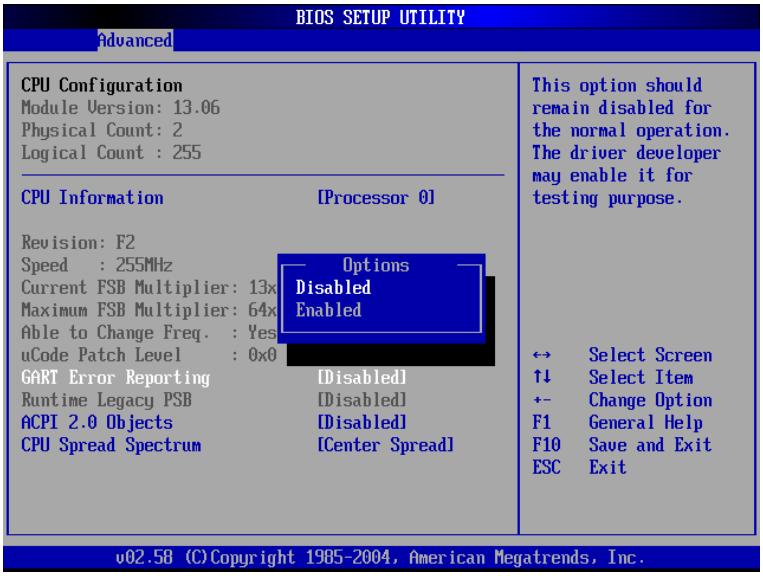
4.1.5 Advanced Menu

You can make these modifications on the advanced menu.



4.1.5.1 CPU Configuration Submenu

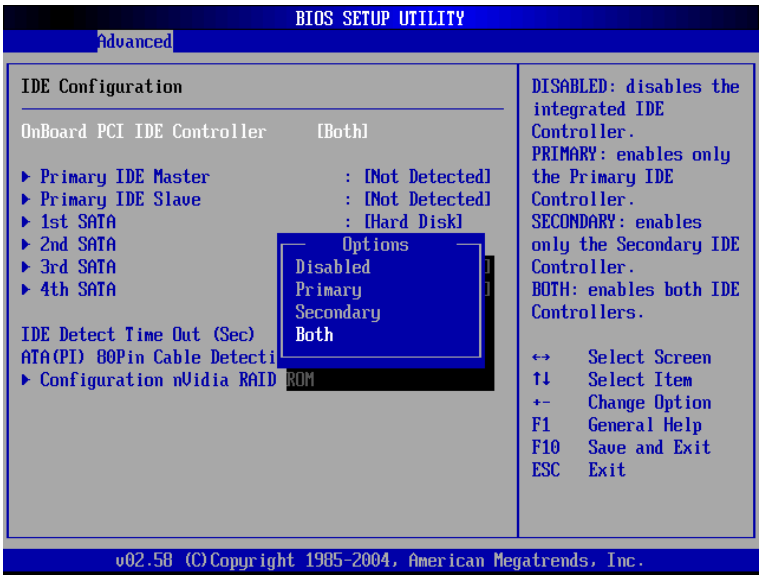
In CPU configuration, you can set up CPU frequency and enable/disable the Error Reporting. GART error reporting should remain disabled for the normal operation.



Feature	Options	Description
GART Error Reporting	Disable Enable	This option should remain disabled for the normal operation. This driver developer may enable it for testing purpose.

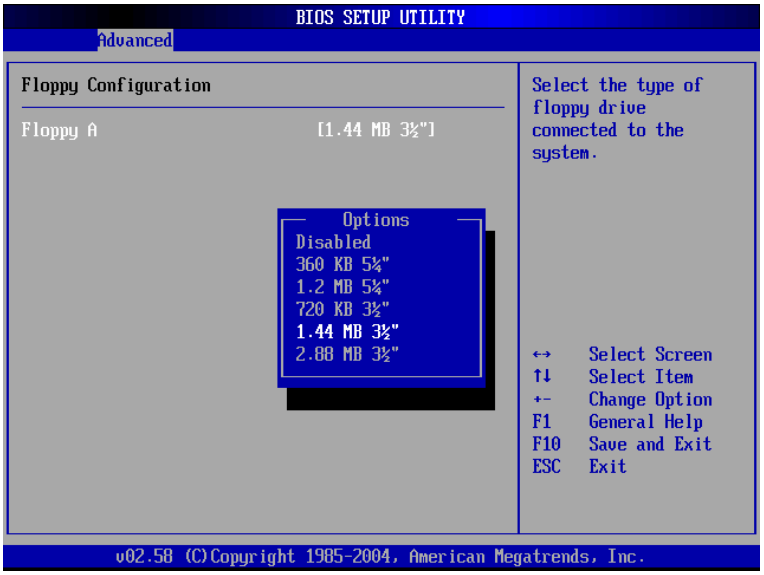
4.1.5.2 IDE Configuration Submenu

You can make the selections on IDE Configuration menu.



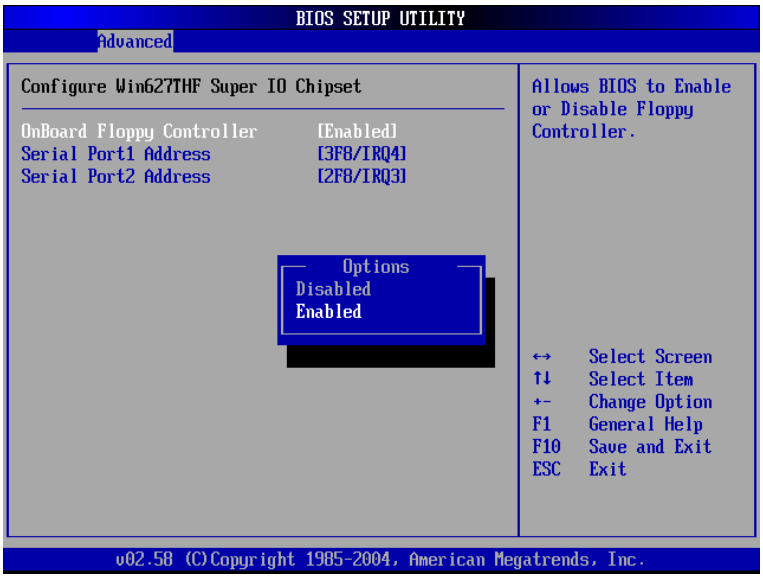
Feature	Options	Description
OnBoard PCI IDE Controller	Disable Primary Secondary Both	Disable: disable the integrated IDE controller Primary: enable only the Primary IDE controller Secondary: enable only the Secondary IDE controller Both: enable both IDE controllers
IDE Detect Time out (sec)	0, 5, 10, 15, 20, 25, 30,35	Select the time out value for detecting ATA/ATAPI device
ATA (PI) 80Pin Cable Detection	Host & Device Host Device	Select the mechanism for detecting 80 pin cable
Configuration nVidia RAID ROM	Disabled Enabled	Disable/enable nVidia ROM.

4.1.5.3 Floppy Configuration Submenu



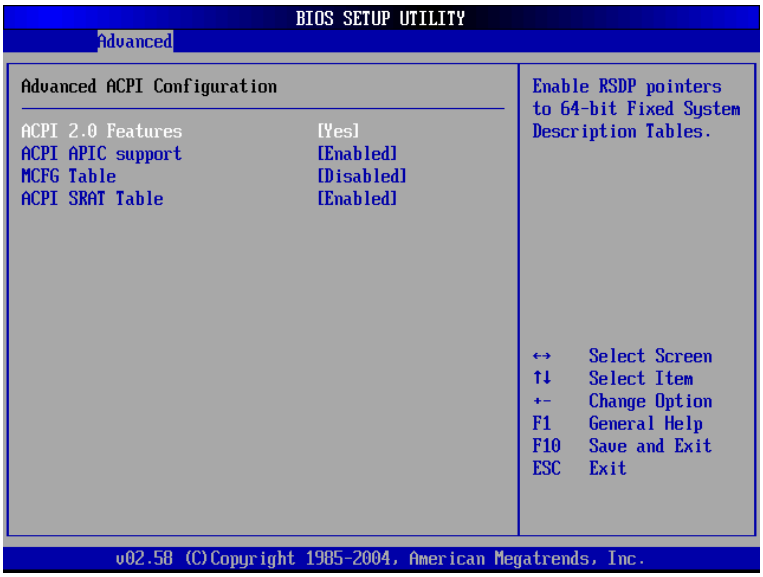
Feature	Options	Description
Floppy Configuration	Disabled 5 1/4” 360 KB 5 1/4” 1.2 MB 3 1/2” 720 KB 3 1/2” 1.44 MB 3 1/2” 2.88 MB	Select Floppy A or Floppy B and then selects floppy-diskette type installed in your system.

4.1.5.4 Super IO Submenu



Feature	Options	Description
OnBoard Floppy Controller	Disabled Enabled	Allows BIOS to Enable or Disable Floppy Controller
Serial Port1 Address	Disabled 3F8/IRQ4 3E8/IRQ4 2E8/IRQ3	Allows BIOS to Select Serial Port1 Base Addresses.
Serial Port2 Address	Disabled 2F8/IRQ3 3E8/IRQ4 2E8/IRQ3	Allows BIOS to Select Serial Port1 Base Addresses.

4.1.5.5 ACPI Configuration Submenu

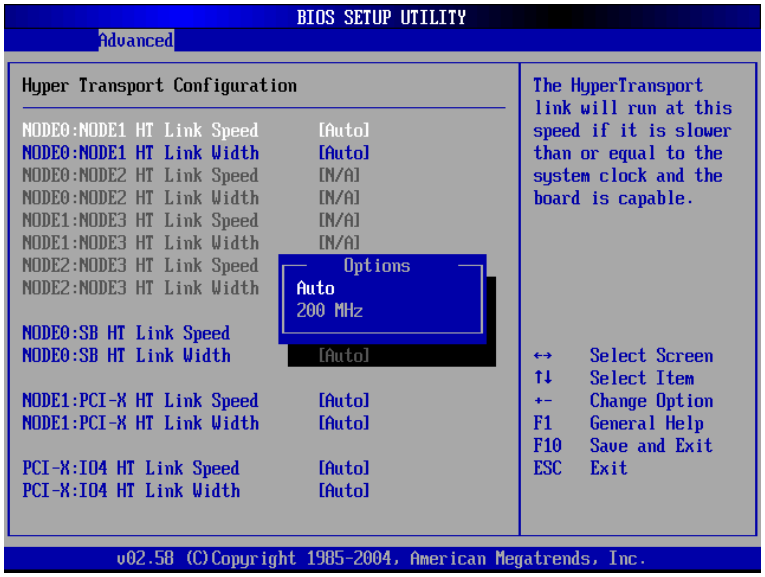


Feature	Options	Description
ACPI Configuration	ACPI Aware O/S Yes/No	Enable: O/S supports ACPI Disable: O/S doesn't support ACPI

4.1.5.6 Hyper Transport Configuration Submenu

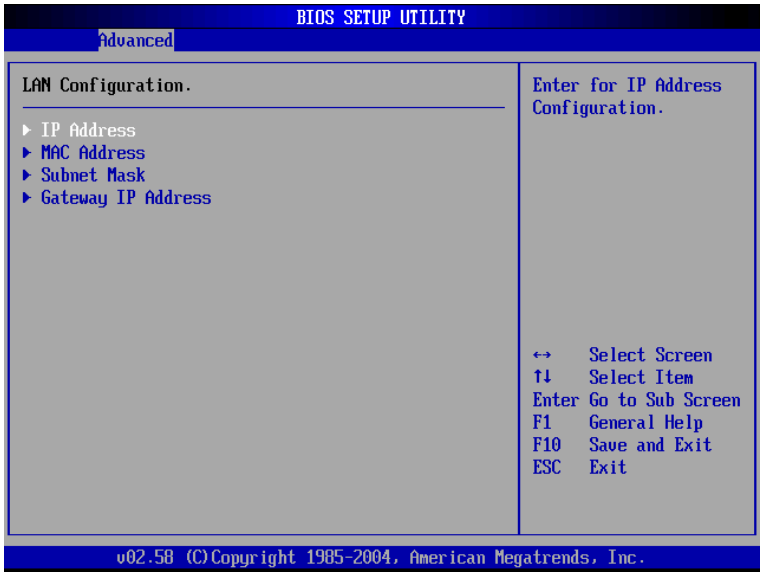
To set up the hyper transport speed and bandwidth, you can adjust over this menu.

The incorrect manipulation will impede the system running.

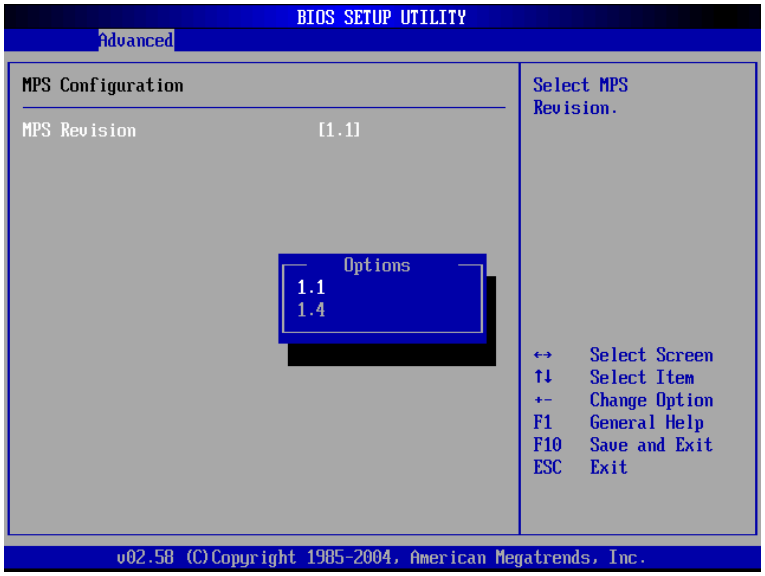

BIOS SETUP UTILITY
Advanced
Hyper Transport Configuration
NODE0:NODE1 HT Link Speed [Auto]
NODE0:NODE1 HT Link Width [Auto]
NODE0:NODE2 HT Link Speed [N/A]
NODE0:NODE2 HT Link Width [N/A]
NODE1:NODE3 HT Link Speed [N/A]
NODE1:NODE3 HT Link Width [N/A]
NODE2:NODE3 HT Link Speed
NODE2:NODE3 HT Link Width
Options
Auto
200 MHz
NODE0:SB HT Link Speed
NODE0:SB HT Link Width [Auto]
NODE1:PCI-X HT Link Speed [Auto]
NODE1:PCI-X HT Link Width [Auto]
PCI-X:IO4 HT Link Speed [Auto]
PCI-X:IO4 HT Link Width [Auto]
The HyperTransport link will run at this speed if it is slower than or equal to the system clock and the board is capable.
↔ Select Screen
↑↓ Select Item
+- Change Option
F1 General Help
F10 Save and Exit
ESC Exit
v02.58 (C)Copyright 1985-2004, American Megatrends, Inc.

4.1.5.7 IPMI Configuration

To set up the BMC LAN Configuration, you can adjust over this menu.

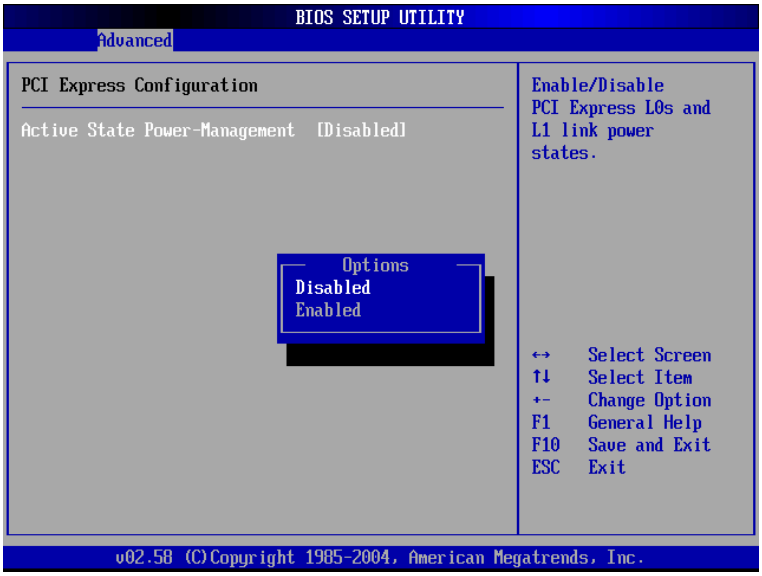


4.1.5.8 MPS Configuration Submenu

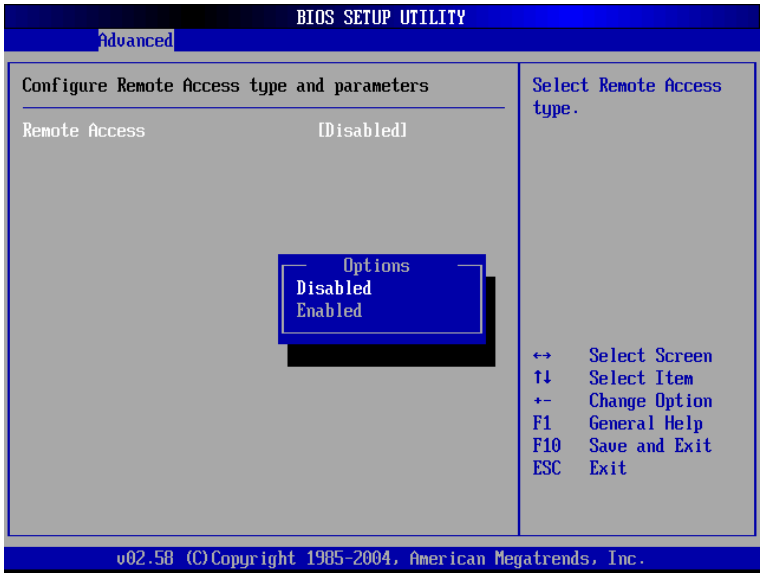


4.1.5.9 PCI Express Configuration Submenu

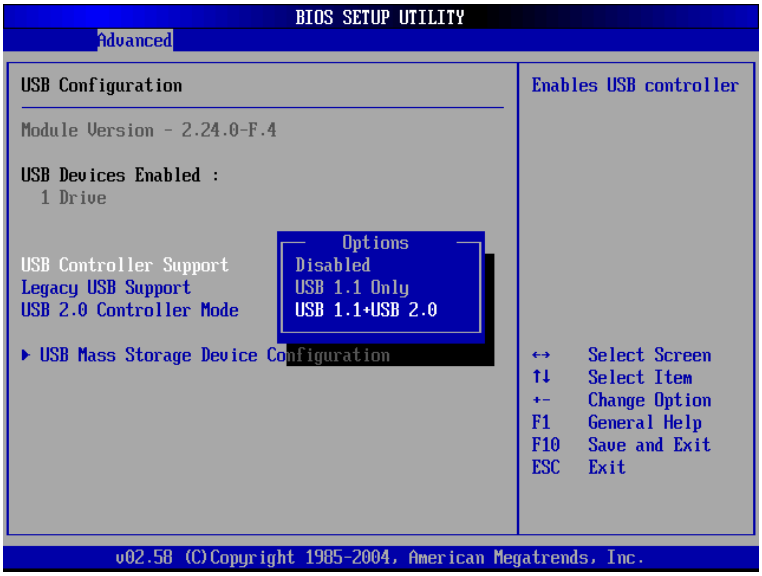
Enable/Disable PCI Express L0 and L1 link power states.



4.1.5.10 Remote Access Configuration Submenu

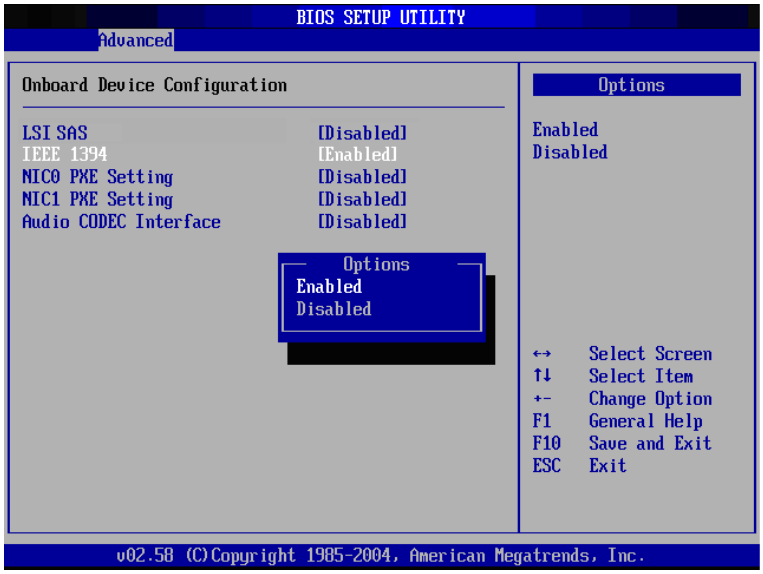


4.1.5.11 USB Configuration Submenu



Feature	Options	Description
USB Controller Support	Disabled USB 1.1 Only USB 1.1+ USB 2.0	Enables USB controller
Legacy USB Support	Disabled/Enabled/ Auto	Enables support for legacy USB Auto option disables legacy support if no USB device connected
USB 2.0 Controller Mode	HiSpeed FullSpeed	Configures the USB 2.0 controller in HiSpeed(480Mbps) or FullSpeed(12Mbps).
USB Mass Storage Device Configuration		Number of seconds POST waits for the USB mass storage device after start unit command.

4.1.5.12 Onboard Device Configuration Submenu



Feature	Options	Description
SAS	Enabled Disabled	On-board SAS controller Enabled/Disabled
IEEE 1394	Enabled Disabled	On-board IEEE 1394 Enabled/Disabled
NIC0 PXE Setting	Enabled Disabled	On-board NIC0 PXE Boot Enabled/Disabled
NIC1 PXE Setting	Enabled Disabled	On-board NIC1 PXE Boot Enabled/Disabled
Audio CODEC Interface	Enabled Disabled	On-board Audio CODEC Enabled/Disabled

4.1.6 PCI PnP Menu

BIOS SETUP UTILITY
Main Advanced PCIPnP Boot Security Chipset Power Exit
Advanced PCI/PnP Settings
WARNING: Setting wrong values in below sections may cause system to malfunction.
Plug & Play O/S [No]
PCI Latency Timer [64]
Allocate IRQ to PCI VGA [Yes]
Palette Snooping [Disabled]
PCI IDE BusMaster [Disabled]
OffBoard PCI/ISA IDE Card [Auto]
IRQ3 [Available]
IRQ4 [Available]
IRQ5 [Available]
IRQ7 [Available]
IRQ9 [Available]
IRQ10 [Available]
IRQ11 [Available]
IRQ14 [Available]
NO: lets the BIOS configure all the devices in the system. YES: lets the operating system configure Plug and Play (PnP) devices not required for boot if your system has a Plug and Play operating system.
↔ Select Screen
↑↓ Select Item
+- Change Option
F1 General Help
F10 Save and Exit
ESC Exit
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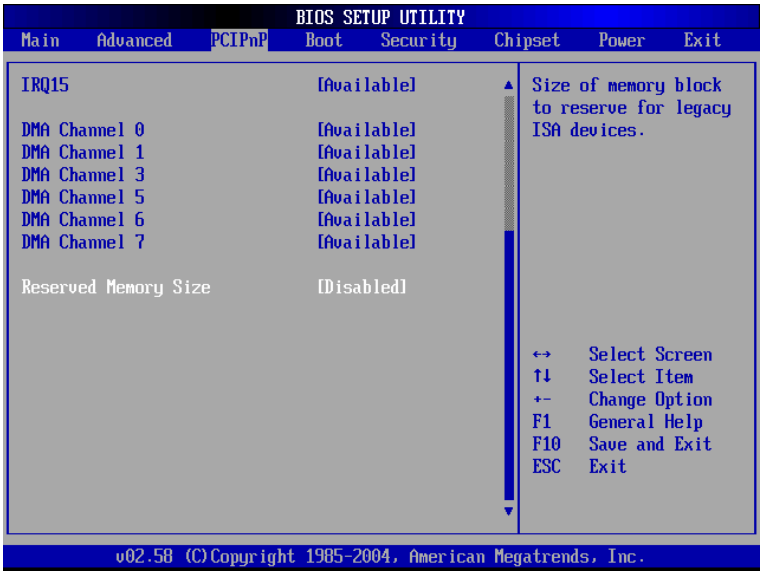
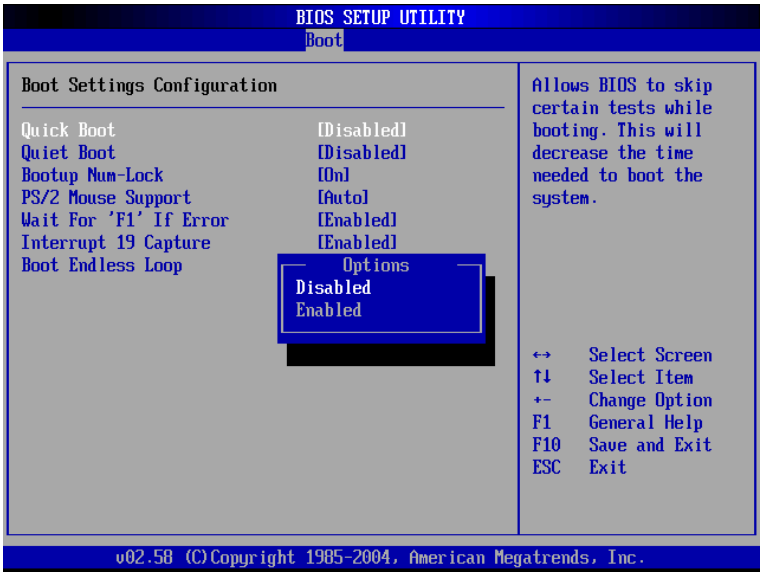
PCI PnP Menu 1


BIOS SETUP UTILITY
Main Advanced PCIPnP Boot Security Chipset Power Exit
IRQ15 [Available]
DMA Channel 0 [Available]
DMA Channel 1 [Available]
DMA Channel 3 [Available]
DMA Channel 5 [Available]
DMA Channel 6 [Available]
DMA Channel 7 [Available]
Reserved Memory Size [Disabled]
Size of memory block to reserve for legacy ISA devices.
↔ Select Screen
↑↓ Select Item
+- Change Option
F1 General Help
F10 Save and Exit
ESC Exit
v02.58 (C)Copyright 1985-2004, American Megatrends, Inc.

PCI PnP Menu 2

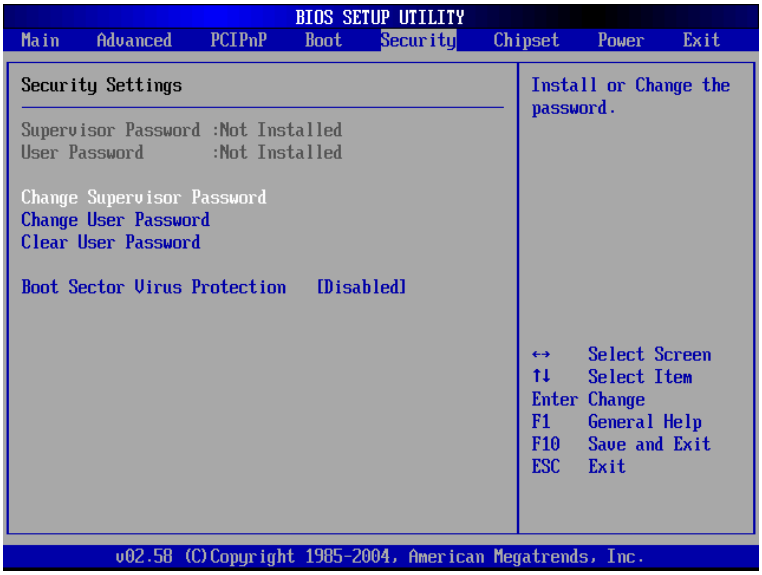
Feature	Options	Description
Plug & Play O/S	Yes No	Yes: lets the O/S configure PnP devices not required for boot if your system has a Plug and Play O/S
PCI Latency Timer	32, 64, 96, 128, 160, 192, 224, 248	Value in units of PCI clocks for PCI device latency timer register
Allocate IRQ to PCI VGA	Yes No	Yes: Assign IRQ to PCI VGA card if card requests IRQ No: Doesn't assign IRQ To PCI VGA card even if card requests IRQ
Palette Snooping	Enabled Disabled	Enabled: informs the PCI devices that an ISA graphics device is installed in the system so the card will function correctly
PCI IDE BusMaster	Enabled Disabled	Enabled: BIOS uses PCI busmastering for reading/writing to IDE drives
Offboard PCI/ISA IDE card	Auto PCI Slot1 PCI Slot2 PCI Slot3 PCI Slot4 PCI Slot5 PCI Slot6	Some PCI IDE cards may require this to be set to the PCI slot number that is holding the card
IRQ3~IRQ15	Available Reserved	Available: specified IRQ is available to be used by PCI/PnP devices Reserve: specified IRQ is reserved for use by legacy ISA devices
DMA Channel 0, 1, 3, 5, 6, 7	Available Reserved	Available: specified DMA is available to be used by PCI/PnP devices Reserve: specified DMA is reserved for use by legacy ISA devices
Reserved Memory Size	Disabled 16K 32K 64K	Size of memory block to reserve for legacy ISA devices

4.1.7 Boot Menu

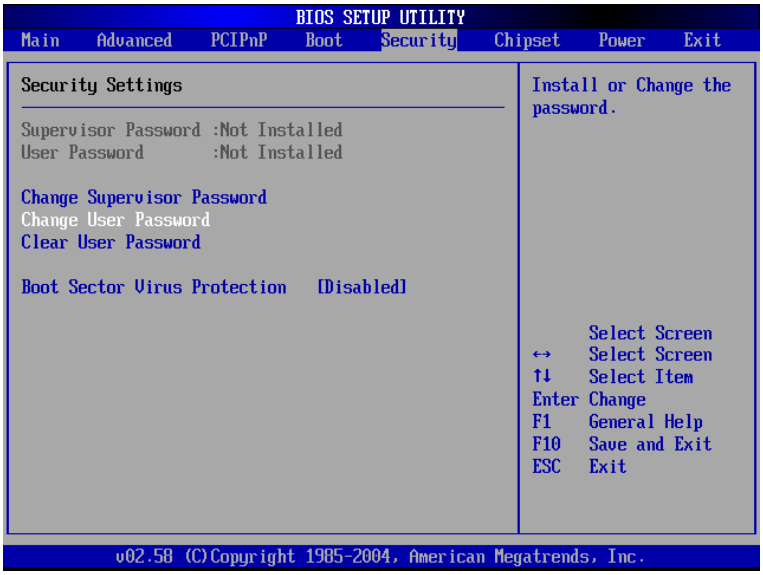


Feature	Options	Description
Quick Boot	Disabled Enabled	Allow BIOS to skip tests while booting
Quiet Boot	Disabled Enabled	Disabled: Display normal POST messages Enabled: Display OEM logo
Bootup Num-Lock	Off On	Select power on state for Num-Lock
PS/2 Mouse Support	Disabled Enabled	Select support for PS/2 mouse
Wait for " F1 " if error	Disabled Enabled	Wait for F1 key to be pressed if error occurs
Interrupt 19 Capture	Disabled Enabled	Enabled: allows option ROMs to trap interrupt 19
Boot Endless Loop	Disabled Enabled	

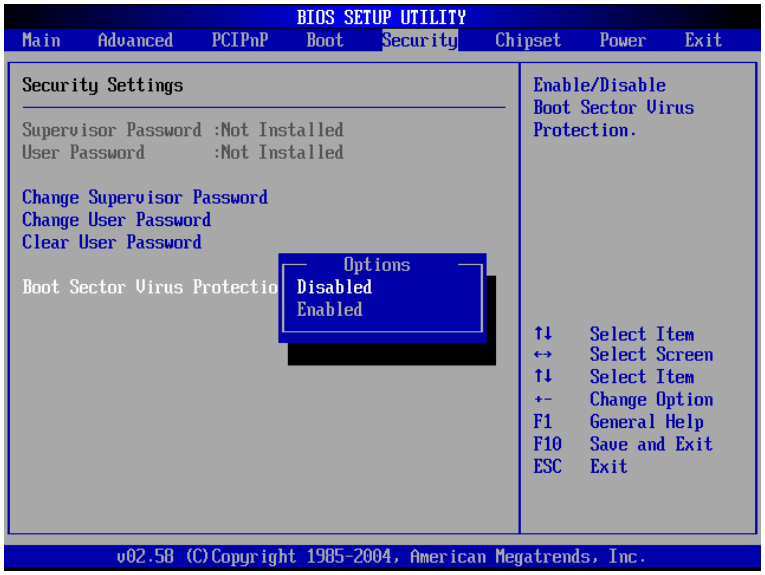
4.1.8 Security Menu



Security Menu 1: Change Supervisor



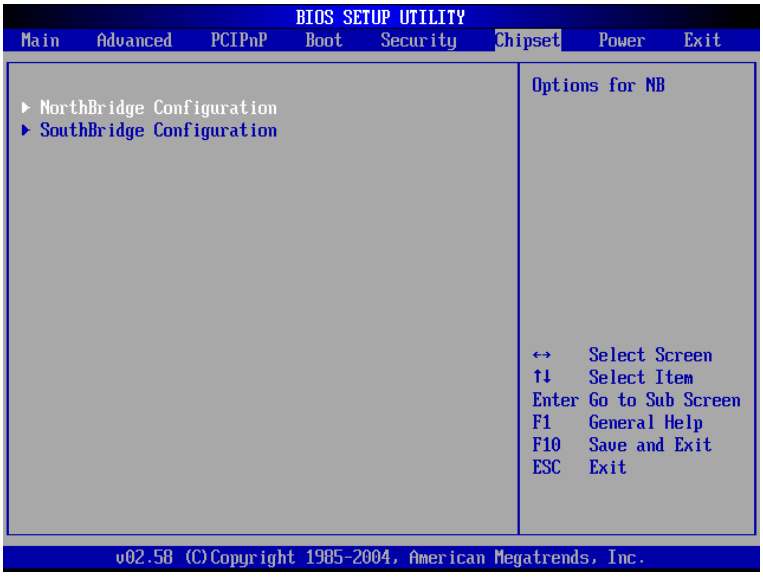
Security Menu 2: Change User



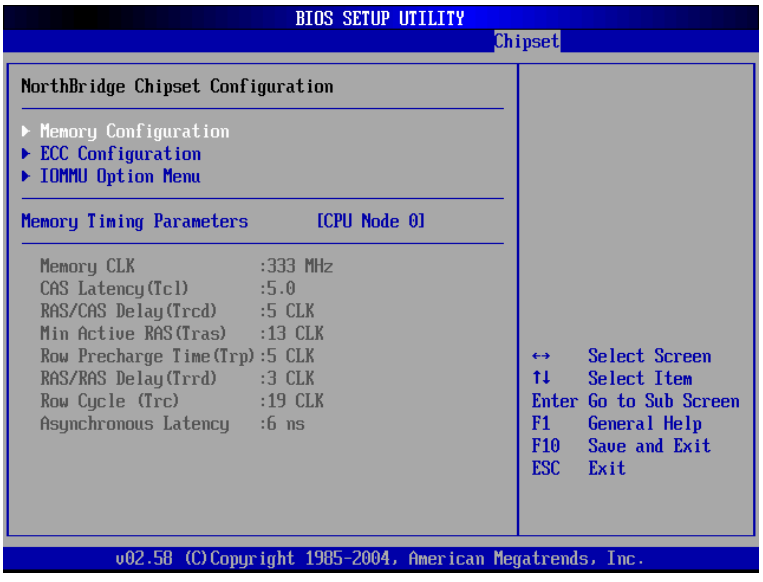
Security Menu 3: Boot Sector

Feature	Options	Description
Change Supervisor Password		Install or change the password
Change User Password		Install or change the password
Boot Sector Virus Protection	Disabled Enabled	Enable/Disable boot sector virus protection

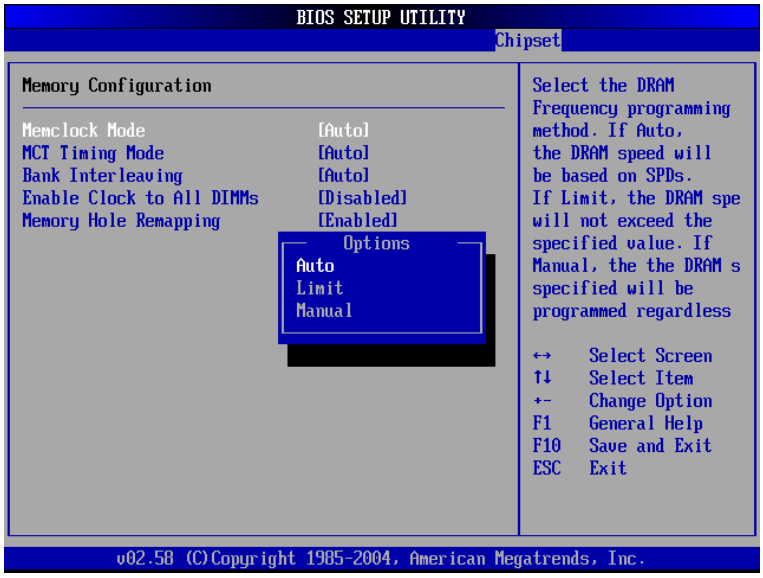
4.1.9 Chipset Configuration Menu



4.1.9.1 NorthBridge Chipset Configuration Submenu

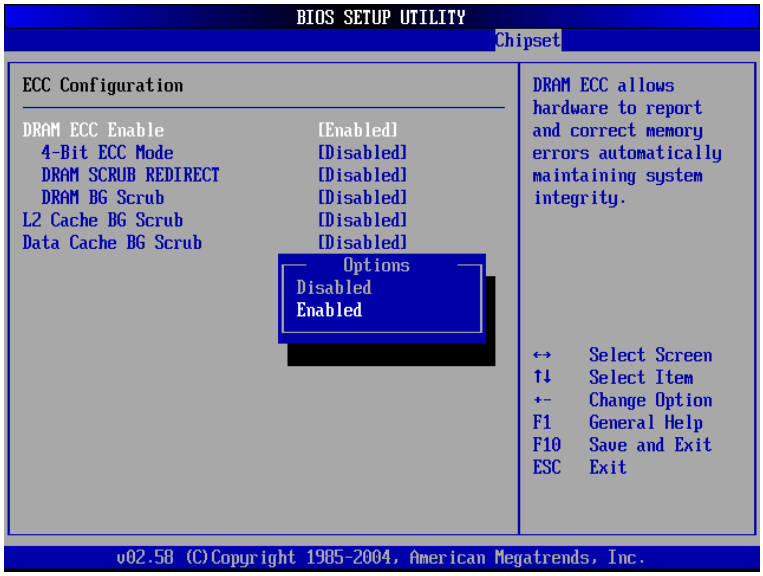


4.1.9.2 Memory Configuration Submenu


BIOS SETUP UTILITY
Chipset
Memory Configuration
Memclock Mode [Auto]
MCT Timing Mode [Auto]
Bank Interleaving [Auto]
Enable Clock to All DIMMs [Disabled]
Memory Hole Remapping [Enabled]
Options
Auto
Limit
Manual
Select the DRAM Frequency programming method. If Auto, the DRAM speed will be based on SPDs. If Limit, the DRAM spe will not exceed the specified value. If Manual, the the DRAM s specified will be programmed regardless
↔ Select Screen
↑↓ Select Item
+- Change Option
F1 General Help
F10 Save and Exit
ESC Exit
v02.58 (C)Copyright 1985-2004, American Megatrends, Inc.

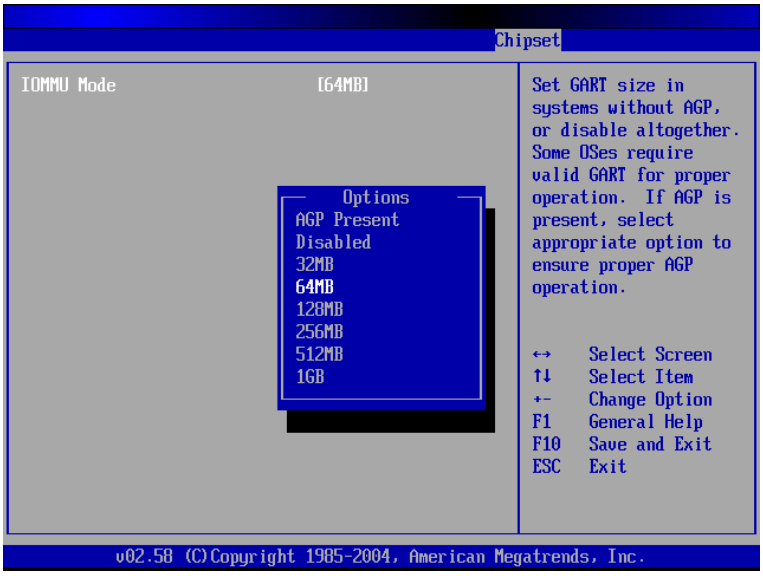
Feature	Options	Description
Memclock Mode	Auto Limit	It can be set by the code using AUTO, or if you use LIMIT, you can set one of the standards.
Bank Interleaving	Auto Disabled	Interleaving allows memory accesses to be spread out over BANKS on the same node, or across NODES, decreasing access contention
Memory Hole Remapping	Disabled Enabled	Enable Software Memory Remapping Around Memory Hole

4.1.9.3 ECC Configuration Submenu



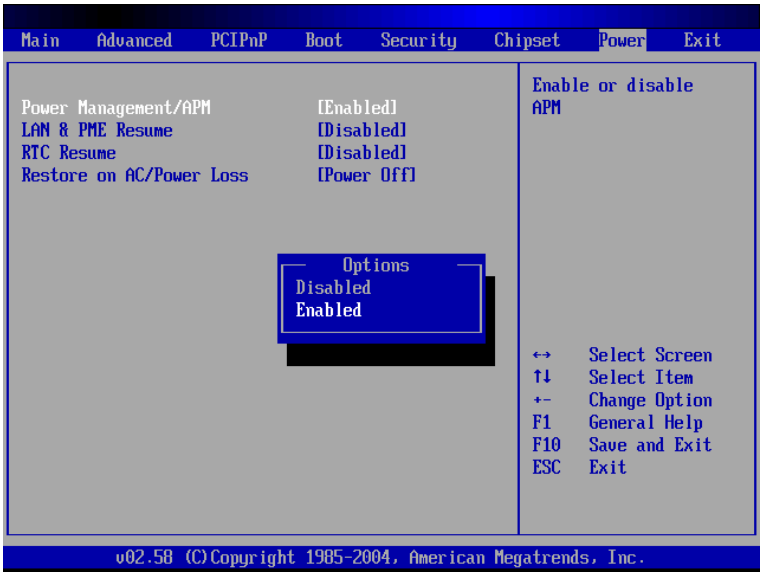
Feature	Options	Description
Master ECC Enable	Disabled Enabled	Master ECC Enables support on all nodes for ECC error detect and correction.
DRAM ECC Enable	Disabled Enabled	DRAM ECC allows hardware to report and correct memory errors automatically maintaining system integrity.
L2 Cache BG Scrub	Disable 40ns 80ns 160ns 320ns 640ns 1.28us 2.56us 5.12us 10.2us 20.5us 41.0us 81.9us 163.8us 327.7us 655.4us	Allows the L2 date cache ram to be corrected while idle.
Date Cache BG Scrub	See above	Allows the L1 date cache ram to be corrected while idle.

4.1.9.4 IOMMU Mode Submenu



Feature	Options	Description
IOMMU Mode	AGP Present Disabled 32MB 64MB 128MB 256MB 512MB 1GB	Set GART size in systems without AGP, or disable altogether. Some OSes require valid GART for proper operation. If AGP is present, select appropriate option to ensure proper AGP operation.

4.1.10 Power Menu

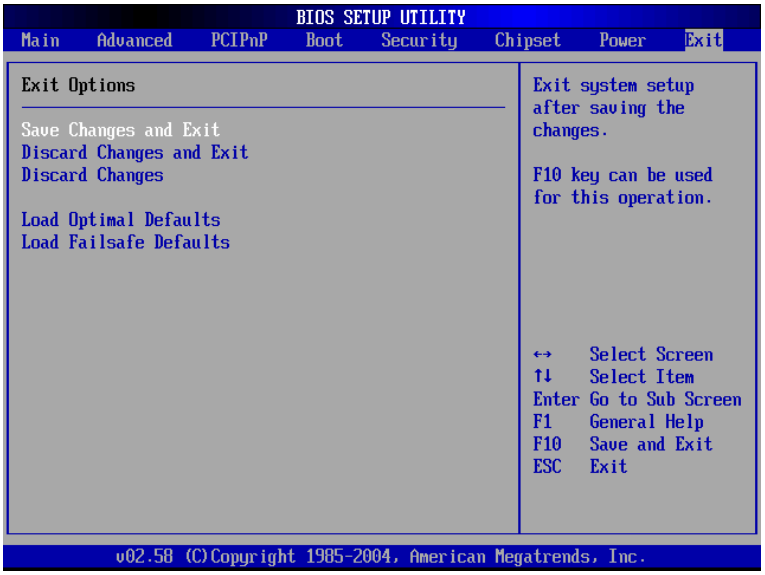


The Power menu items allow you to change the power management settings.

Select an item then press Enter to display the configuration options.

Feature	Options	Description
Power Management/APM	Disabled Enabled	Enable or disable APM
LAN & PME Resume	Disabled Enabled	Enabled or disabled Internal 802.3 MAC to generate P.M.E in SoftOFF.
RTC Resume	Disabled Enabled	Disabled/Enabled RTC event to wake after a power failure
Restore on AC/Power Loss	Power Off Power On Last State	Power Off Power On Last State

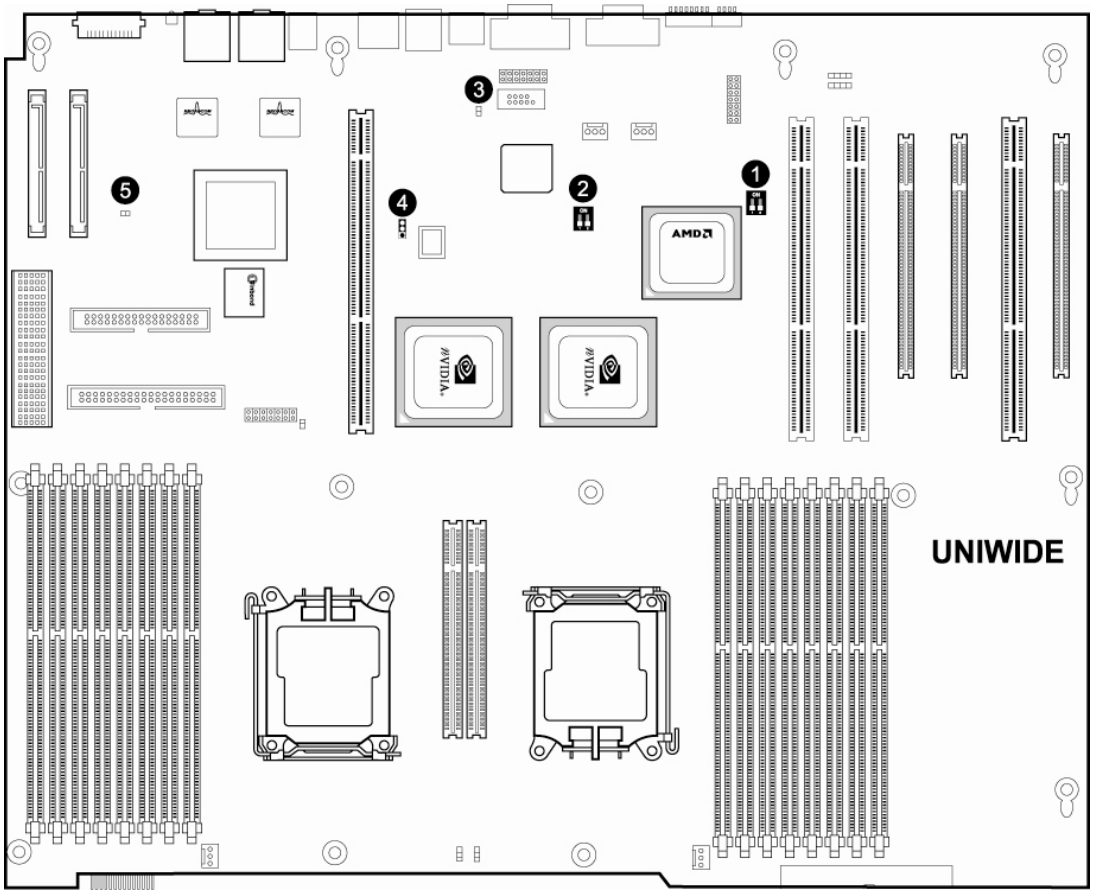
4.1.11 Exit Menu


BIOS SETUP UTILITY
Main Advanced PCIPnP Boot Security Chipset Power Exit
Exit Options
Save Changes and Exit
Discard Changes and Exit
Discard Changes
Load Optimal Defaults
Load Failsafe Defaults
Exit system setup after saving the changes.
F10 key can be used for this operation.
↔ Select Screen
↑↓ Select Item
Enter Go to Sub Screen
F1 General Help
F10 Save and Exit
ESC Exit
v02.58 (C)Copyright 1985-2004, American Megatrends, Inc.

Feature	Description
Save Changes and Exit	Exit system setup after saving the changes F10 key can be used for this operation
Discard Changes and Exit	Exit system setup without saving the changes ESC key can be used for this operation
Discard Changes	Discard changes done so far to any of the setup question F7 key can be used for this operation
Load Optimal Defaults	Load optimal default values for all the setup questions F9 key can be used for this operation
Load Failsafe Defaults	Load Failsafe default values for all the setup questions F8 key can be used for this operation

4.2 Jumper Setting

This section covers the jumper setting. Refer to the following illustration for the location of the jumpers.



① PCI-X Speed CHB(J22)

② PCI-X Speed CHA(J26)

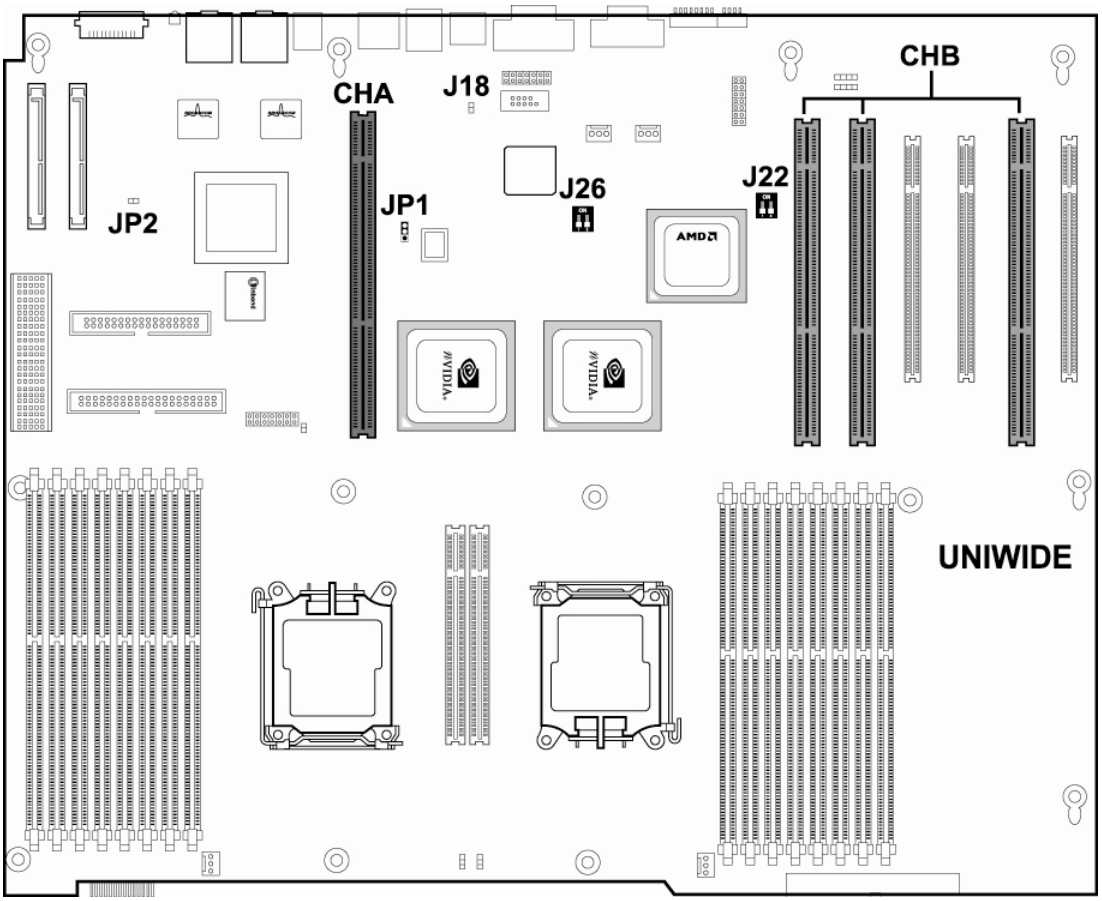
③ VGA Enable / Disable(J18)

④ Clear CMOS(JP1)

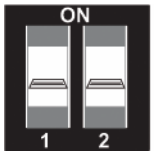
⑤ External SAS Enable / Disable(JP2)

4.2.1 PCI-X Speed Setting(J22, J26)

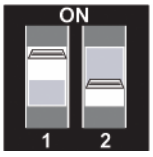
PCI-X speed can be selected by the switch. Please follow the below instruction.



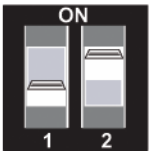
	133	100	66
1	OFF	ON	OFF
2	OFF	OFF	ON



1 Off: 2 Off - 133MHz



1 On: 2 Off - 100MHz



1 Off: 2 On - 66MHz

4.2.2 VGA Enable / Disable(J18)

This header lets you set your VGA port function. You can choose enable or disable this function or not. Onboard VGA can be disabled by setting this jumper on.

ON	OFF
Disable	Enable(default)

4.2.3 Clear CMOS Header

The onboard button cell battery powers the CMOS RAM. It contains all the BIOS setup information. Normally, it is necessary to keep the jumper connected to pin1 and pin2 (Default) to retain the RTC data as shown below.

1-2	2-3
Clear CMOS	Normal(default)

Follow these instructions to clear the CMOS RTC data:

① AC off.

② Short pin2 and pin3 with a jumper for a few seconds.

③ Replace the jumper on pin1 and pin2.

④ Turn on your computer by pressing the power-on button.

⑤ Hold down <Delete> during boot and select either the <Load Optimal Defaults> or <Load Failsafe Defaults> option in the selection "Exit". Then re-enter BIOS setup to re-enter user preferences.

4.2.4 External SAS Port Enable/Disable(JP2)

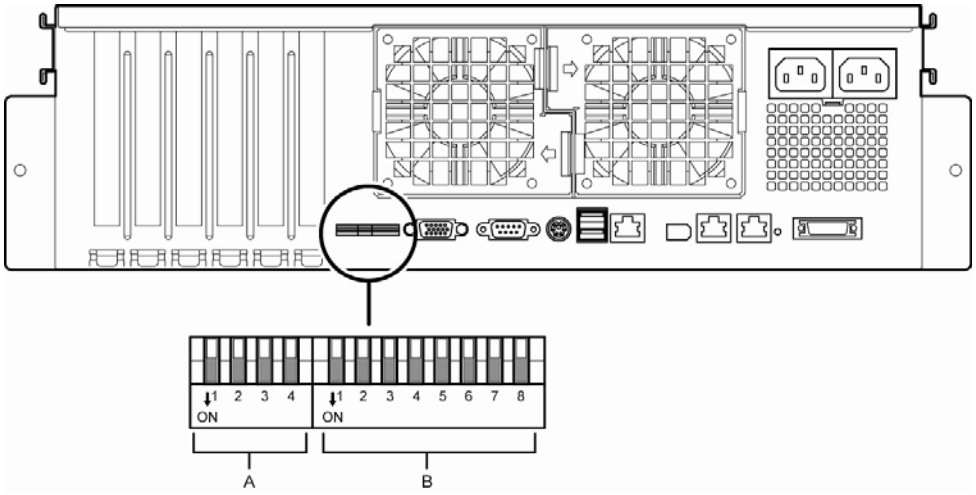
This header lets you set your External SAS port Enable/Disable function. You can choose enable or disable this function or not.

ON	OFF
Disable	Enable

4.2.5 Geographical ID Setting

ID switch is used to decide identification, CPU number and type of server.
ServerDome is monitoring on the basis of identification, CPU number and type of server.

CAUTION
You have to install the ID switch before BMC F/W update.



ID Assignment
This sets up identification information of server.

ID	Binary	Switches(B)							
		1	2	3	4	5	6	7	8
0	**00000000**	**OFF**	**OFF**	**OFF**	**OFF**	**OFF**	**OFF**	**OFF**	**OFF**
10	**00001010**	**OFF**	**ON**	**OFF**	**ON**	**OFF**	**OFF**	**OFF**	**OFF**
124	**01111100**	**OFF**	**OFF**	**ON**	**ON**	**ON**	**ON**	**ON**	**OFF**

CPU Assignment

This sets up CPU number of server.

ID	Description	Binary	Switches(A)	
			1	2
1	1-way	00	OFF	OFF
2	2-way	01	ON	OFF
3	3-way	10	OFF	ON
4	4-way	11	ON	ON

Server Type Assignment

This sets up server type.

Type	Description	Binary	Switches(A)	
			3	4
1U	2way passive	00	OFF	OFF
3U	2way Active/4way	01	ON	OFF
3U	Only 2way Passive	10	OFF	ON

4.2.6 SAS Cable Connection

Connector J10, J11 are used to connect SAS cable to each SAS HDD.

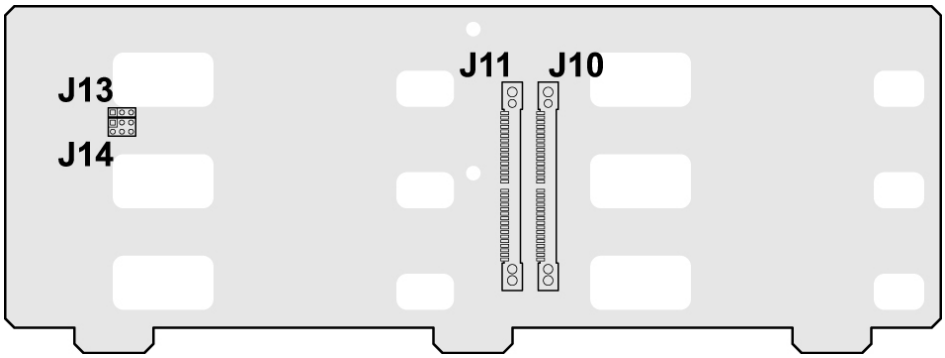
Connector	Description
J10	SAS Port 0-3
J11	SAS Port 4-5

4.2.7 Jumper Setting on the SAS BP

Jumper J13, J14 are used to decide which enclosure monitoring controller will use in system.

Default setting is “1-2” for J13 and “1-3, 2-4” for J14 on-board SATA controller. If you want to use add-on another SATA controller supporting SES(I2C) interface, you have to set the jumper to “2-3” for J13 and “3-5, 4-6” for J14.

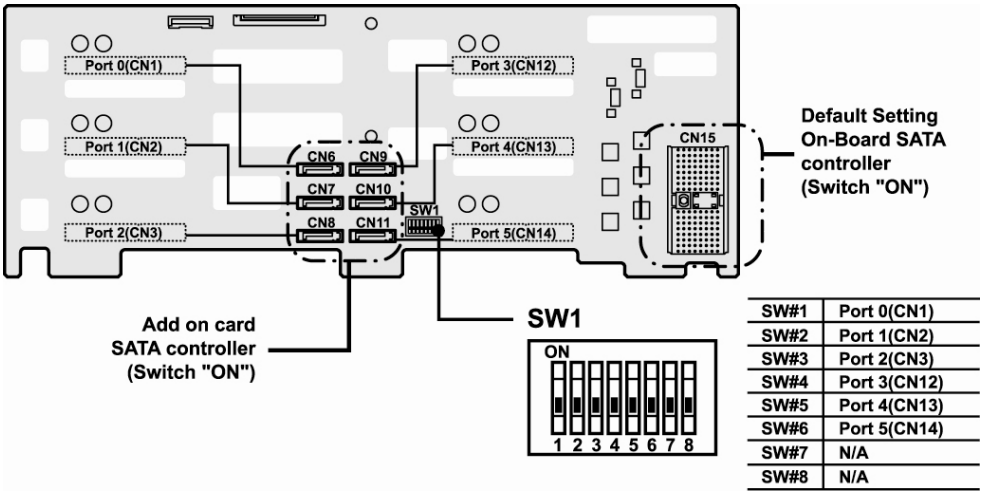
Jumper	SGPIO	SES(I2C)
J13	1-2	2-3
J14	1-3	3-5
	2-4	4-6



4.2.8 DIP SW1 Setting on the SATA BP

DIP SW1 is used to decide which controller we will use in system.

Default setting is all “ON” for on-board SATA controller. If you want to use add-on SATA controller, you have to set the switch to “ON” like below picture.



SW#1	Port 0(CN1)
SW#2	Port 1(CN2)
SW#3	Port 2(CN3)
SW#4	Port 3(CN12)
SW#5	Port 4(CN13)
SW#6	Port 5(CN14)
SW#7	N/A
SW#8	N/A

5. Software & Utilities

5.1 NVRAID

5.1.1 Basic Configuration Instruction

The following are the basic steps for configuring NVRAID

5.1.1.1 Non-Bootable RAID Array

① Choose the hard disks that are to be RAID enabled in the system BIOS.

② Specify the RAID level, either Mirroring (RAID 1), Striping (RAID 0), Striping and Mirroring (RAID 0+1), or Spanning (JBOD) and create the desired RAID array.

③ Install the operating system on one hard disk, then reboot the system.

④ Run the Windows nForce Setup application and install the RAID driver.

⑤ Initialize the NVRAID Array.

5.1.1.2 Bootable RAID Array

① Choose the hard disks that are to be RAID enabled in the system BIOS.

② Specify the RAID level, either Mirroring (RAID 1), Striping (RAID 0), Striping and Mirroring (RAID 0+1), or Spanning (JBOD) and create the desired RAID array.

③ Boot from the Windows CD, then press F6 when the Windows Setup appears.

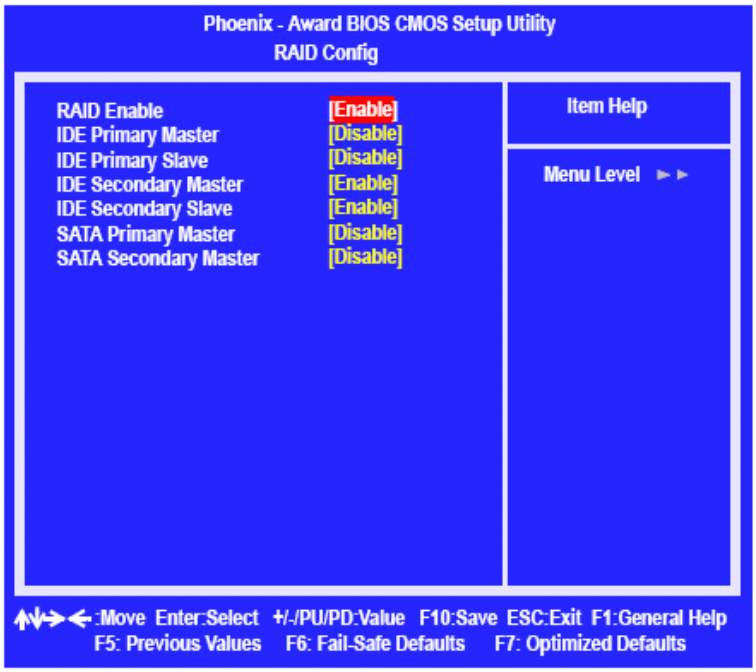
④ Initialize the NVRAID Array.

⑤ Initialize the NVRAID Array.

5.1.2 Setting up the BIOS

① Start your computer, then press Delete to enter the BIOS setup.
Use the arrow keys to select Integrated Peripherals, then press Enter.

② Use the arrow keys to select the RAID Config(see the picture), then press Enter.


Phoenix - Award BIOS CMOS Setup Utility
RAID Config
RAID Enable [Enable]
IDE Primary Master [Disable]
IDE Primary Slave [Disable]
IDE Secondary Master [Enable]
IDE Secondary Slave [Enable]
SATA Primary Master [Disable]
SATA Secondary Master [Disable]
Item Help
Menu Level ►►
:Move Enter:Select +/-/PU/PD:Value F10:Save ESC:Exit F1:General Help
F5: Previous Values F6: Fail-Safe Defaults F7: Optimized Defaults

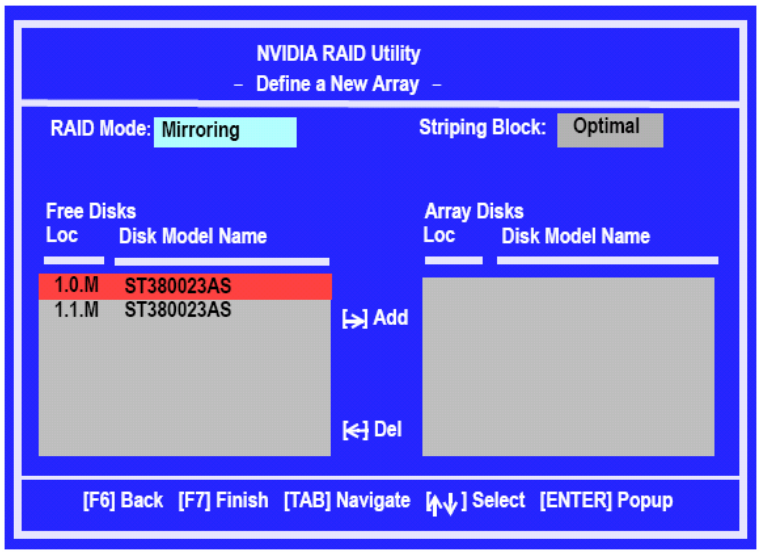
③ From the RAID Config window, "enable" the RAID Enable, the other items would be light, then you can enable the disk that you want to use as RAID disks.

④ Press F10 to save the configuration and exit.

5.1.3 Entering the RAID BIOS Setup Basic Configuration Instruction

① After rebooting your system, wait until you see the RAID software prompting you to press F10. The RAID prompt appears as part of the system POST and boot process prior to loading the OS.

② Press <N>, and the NVIDIA RAID Utility-Define a New Array window will appears(See the picture). The default RAID Mode is set to Mirroring and Striping Block is set to Optimal.



5.1.3.1 Understanding the Define a New Array Window

Use the Define a New Array window to

- Select the RAID Mode
- Set up the Striping Block
- Specify which disks to use for the RAID Array

Depending on the platform used, the system can have one or more channels.
In a typical system there is usually one controller and multiple channels, and each channel has a slave and a master.
The channel/controller/master/slave status of each hard disk is given in the Loc(location) columns of the Free Disks and Array Disks lists.

1 . 0 . M

M : Master
S : Slave
0 : Channel
Adapter - adapter 0 is used for PATA drives
1 and above is used for SATA drives.

In upper picture 1.0.M means the hard drive is attached to Adapter 1, Channel 0, and the drive is set to Master. The following is a list of all possible combinations:

Serial ATA	**1.0.M**	**Adapter 1, Channel 0, Master**
	1.1.M	**Adapter 1, Channel 1, Master**
	1.2.M	**Adapter 1, Channel 2, Master**
	1.3.M	**Adapter 1, Channel 3, Master**
	2.1.M	**Adapter 2, Channel 1, Master**
	2.2.M	**Adapter 2, Channel 2, Master**

NOTICE

There is no such thing as Slave drive in Serial ATA. All drives are considered to be Master since there is a one to one connection between the drive and the controller.

5.1.3.2 Using the Define a New Array Window

If necessary, press the tab key to move from field to field until the appropriate field is highlighted.

Selecting the RAID Mode

By default, this is set to mirroring. To change to a different RAID mode, press the down arrow key until the mode that you want appears in the RAID mode box-either mirroring, striping, spanning, or stripe mirroring.

Selecting the Striping Block Size

Striping block size is given in kilobytes, and affects how data is arranged on the disk. It is recommended to leave this value at the default Optimal, which is 32KB, but the values can be between 4 KB and 128 KB.

Assigning the Disks

The disks that you enabled from the RAID Config BIOS setup page appear in the Free Disks block. These are the drives that are available for use as RAID array disks.

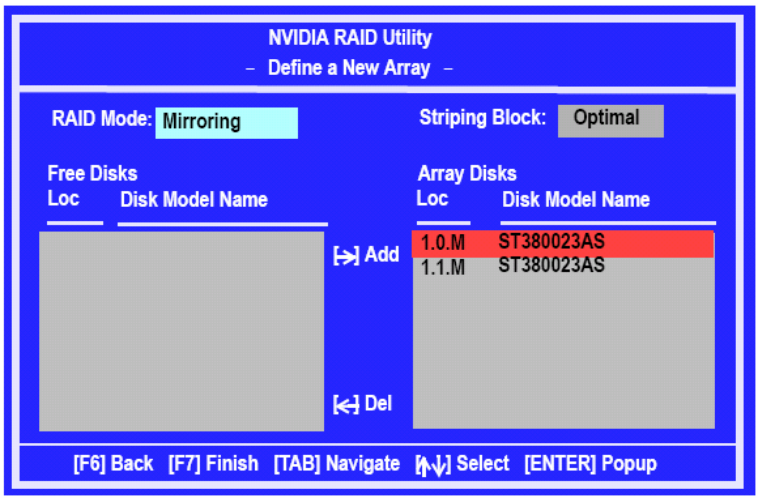
To designate a free disk to be used as a RAID array disk,

① Tab to the Free Disks section. The first disk in the list is selected

② Move it from the Free Disks block to the Array Disks block by pressing the right arrow key(→). The first disk in the list is moved, and the next disk in the list is selected and ready to be moved.

③ Continue pressing the right-arrow key (→) until all the disks that you want to use as RAID array disks appear in the Array Disks block.

The below picture illustrates the Define a New Array window after two disks have been assigned as RAID1 array disks.

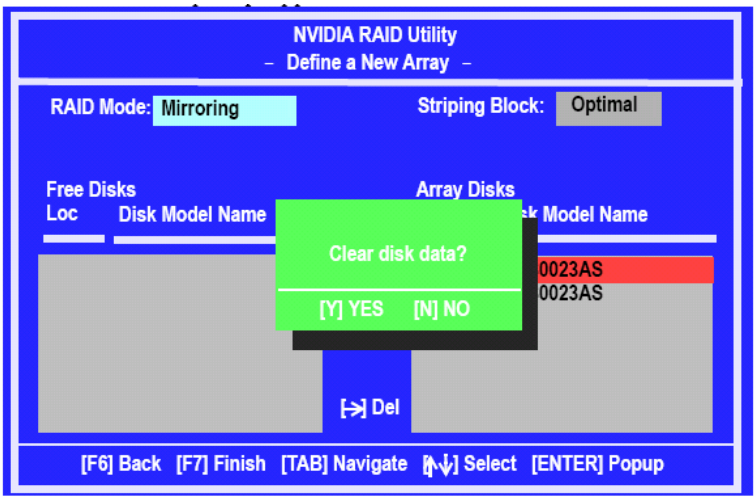


NVIDIA RAID Utility – Array Disks

5.1.3.3 Completing the RAID BIOS Setup

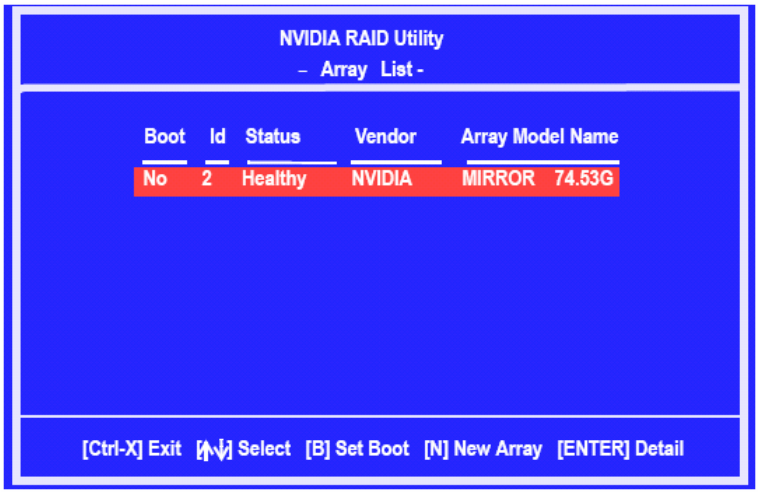
① After assigning your RAID array disks, press F7.

The Clear disk data prompt appears.



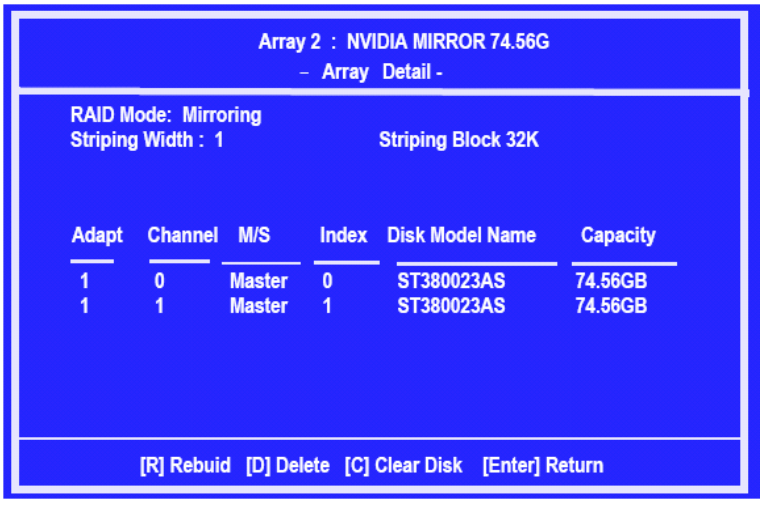
② Press Y to clear all drive data.

The Array List screen appears, where you can review the RAID arrays that you have set up.


NVIDIA RAID Utility
- Array List -
Boot Id Status Vendor Array Model Name
No 2 Healthy NVIDIA MIRROR 74.53G
[Ctrl-X] Exit [↑↓] Select [B] Set Boot [N] New Array [ENTER] Detail

③ Use the arrow keys to select the array that you want to set up, and then press Enter.

The Array Detail screen appears.


Array 2 : NVIDIA MIRROR 74.56G
- Array Detail -
RAID Mode: Mirroring
Striping Width : 1
Striping Block 32K
Adapt Channel M/S Index Disk Model Name Capacity
1 0 Master 0 ST380023AS 74.56GB
1 1 Master 1 ST380023AS 74.56GB
[R] Rebuid [D] Delete [C] Clear Disk [Enter] Return

The Array Detail screen shows information about the array that you selected, such as Striping Block used, RAID Mode, Striping Width, Disk Model Name, and disk capacity.

④ If you want to mark this disk as empty and wipe out all its contents then press C.

⑤ At the prompt, press Y to wipe out all the data, otherwise press N.

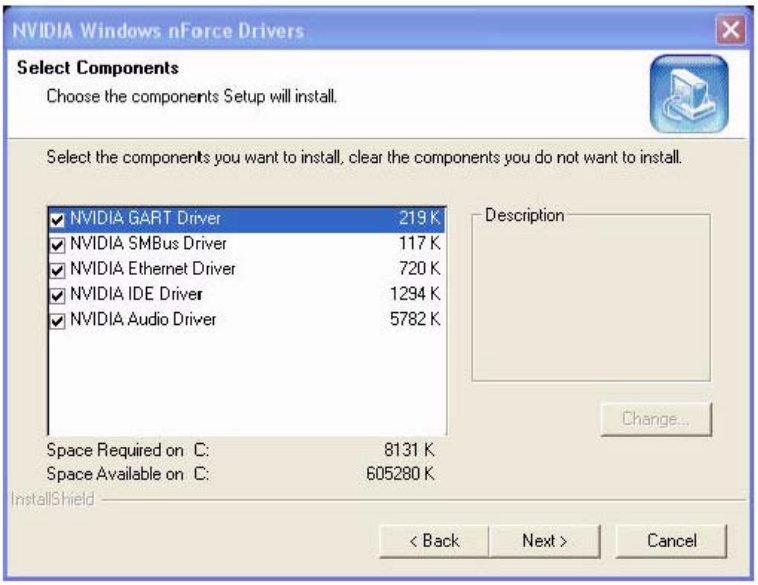
⑥ Press Enter again to go back to the previous window and then press F10 to exit the RAID setup.

5.1.4 NVIDIA RAID Utility installation

5.1.4.1 Installing the NVIDIA RAID Software Under Windows (For Non-bootable RAID Array)

This section describes how to setup the application and install the RAID software which will upgrade the Windows IDE driver and install the RAID driver.

① Start the nForce Setup program to open the NVIDIA Windows nForce Drivers page.


NVIDIA Windows nForce Drivers
Select Components
Choose the components Setup will install.
Select the components you want to install, clear the components you do not want to install.
NVIDIA GART Driver 219 K
NVIDIA SMBus Driver 117 K
NVIDIA Ethernet Driver 720 K
NVIDIA IDE Driver 1294 K
NVIDIA Audio Driver 5782 K
Description
Change...
Space Required on C: 8131 K
Space Available on C: 605280 K
InstallShield
< Back
Next >
Cancel

② Select the modules that you want to install. Select the relative options that you have configured.

③ Click Next and then follow the instructions.

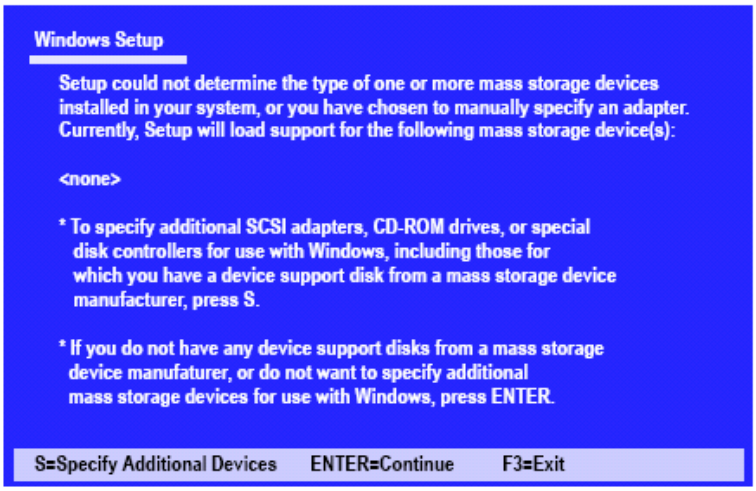
④ After the installation is completed, be sure to reboot the system.

⑤ After the reboot. Initialize the newly created array.

5.1.4.2 Installing the RAID Driver (For bootable RAID Array)

① After you complete the RAID BIOS setup, boot from the Windows CD, and the Windows Setup program starts.

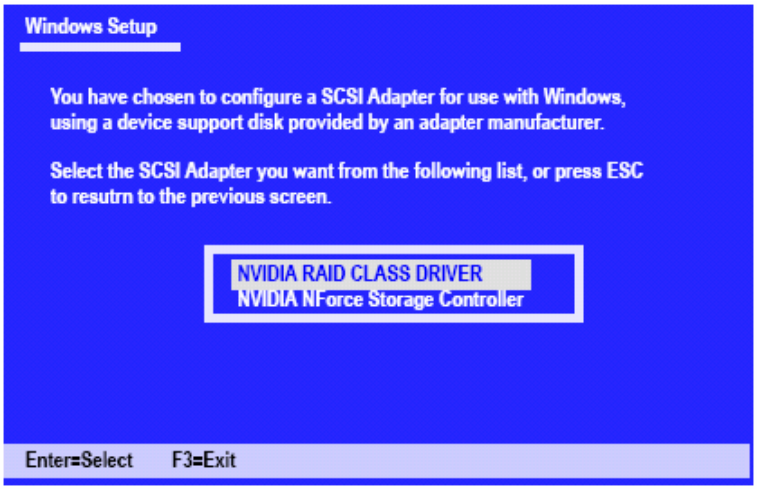
② Press F6 and wait for the Windows Setup screen to appear.


Windows Setup
Setup could not determine the type of one or more mass storage devices installed in your system, or you have chosen to manually specify an adapter. Currently, Setup will load support for the following mass storage device(s):
<none>
* To specify additional SCSI adapters, CD-ROM drives, or special disk controllers for use with Windows, including those for which you have a device support disk from a mass storage device manufacturer, press S.
* If you do not have any device support disks from a mass storage device manufaturer, or do not want to specify additional mass storage devices for use with Windows, press ENTER.
S=Specify Additional Devices
ENTER=Continue
F3=Exit

③ Specify the NVIDIA drivers:

a. Insert the floppy that has the RAID driver, press S, then press Enter.

The Windows Setup screen appears as below:

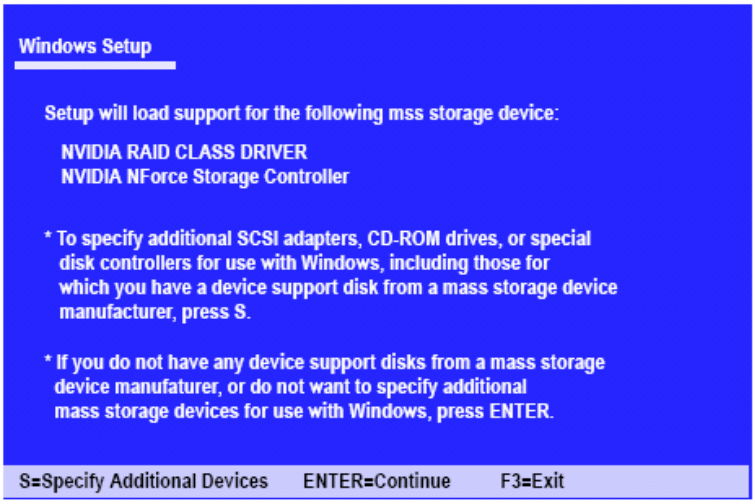

Windows Setup
You have chosen to configure a SCSI Adapter for use with Windows, using a device support disk provided by an adapter manufacturer.
Select the SCSI Adapter you want from the following list, or press ESC to resutrn to the previous screen.
NVIDIA RAID CLASS DRIVER
NVIDIA NForce Storage Controller
Enter=Select
F3=Exit

b. Select "NVIDIA RAID CLASS DIRVER" and then press Enter

c. Press S again at the Specify Devices screen, then press Enter.

d. Select " NVIDIA nForce Storage Controller" and then press Enter.

e. The following Windows Setup screen appears listing both drivers:


Windows Setup
Setup will load support for the following mss storage device:
NVIDIA RAID CLASS DRIVER
NVIDIA NForce Storage Controller
* To specify additional SCSI adapters, CD-ROM drives, or special disk controllers for use with Windows, including those for which you have a device support disk from a mass storage device manufacturer, press S.
* If you do not have any device support disks from a mass storage device manufaturer, or do not want to specify additional mass storage devices for use with Windows, press ENTER.
S=Specify Additional Devices
ENTER=Continue
F3=Exit

④ Press Enter to continue with operating system Installation, Be sure to copy the files from the floppy is complete, then take out the floppy.

⑤ Following the instructions on how to install operating system, During the GUI portion of the installation you might be prompted to click Yes to install the RAID driver. Click Yes as many times as needed in order to finish the installation.

This will not be an issue with a signed driver.

NOTICE

Each time you add a new hard drive to a RAID array, the RAID driver will have to be installed under Windows once for that hard drive. After that, the driver will not have to be installed.

5.2 LSILogic SAS RAID(Optional)

This chapter provides information how to configure and use the components of the LSI Logic Integrated RAID (IR) software with LSI SAS 1068/1068E controllers.

- You may need to run the SAS BIOS setup utility when:
- You want to change the default SAS controller settings for customized features.
- You intend to manage any of the attached SAS devices.

5.2.1 Introduction to Integrated RAID

This section provides an overview of the LSI Logic Integrated RAID solution for LSI Logic SAS controllers, its features, and its benefits.

The LSI Logic Integrated RAID solution provides cost benefits for the server or workstation market where the extra performance, storage capacity, and/or redundancy of a RAID configuration are required.

- **Integrated Mirroring (IM)**, which provides features of RAID 1 and RAID 1E (RAID 1 Enhanced). RAID 1E is also called Integrated Mirroring Enhanced (IME).
- **Integrated Striping (IS)**, which provides features of RAID 0.

By simplifying the IM and IS configuration options and by providing firmware support in its host adapters, LSI Logic can offer the Integrated RAID solution at a lower cost than a hardware RAID implementation.

Fusion-MPT™ firmware supports IM and IS volumes. You can configure IM and IS volumes together on the same LSI Logic SAS controller.

Integrated RAID Benefits and Features

- Low cost RAID volume creation meets the needs of most internal RAID installations
- Easy to use - installation and configuration are not complex
- System can boot from an IM, IME, or IS volume
- No special OS-specific software required
- High reliability and data integrity
  - Non-volatile write journaling
  - Physical disks not visible to OS or to application software
- Low host CPU and PCI bus utilization
- Fusion-MPT architecture provides processing power
  - Shared memory architecture minimizes external memory requests
  - Functionality is contained in device hardware and firmware

5.2.2 Integrated Mirroring Overview

This section provides an overview of the LSI Logic Integrated Mirroring (IM) feature.

5.2.2.1 Introduction

As a result of the shift towards Network Attached Storage (NAS), ISPs need a cost effective, fault-tolerant solution to protect the operating systems on small form factor, high-density, rack-mountable servers. The LSI Logic Integrated Mirroring (IM) feature—which includes Integrated Mirroring Enhanced (IME)— provide data protection for the system boot volume to safeguard critical information such as the operating system on servers and high performance workstations. The Integrated Mirroring feature gives customers a robust, high-performance, fault-tolerant solution to their storage needs, at a lower cost than a dedicated RAID controller.

The Integrated Mirroring feature supports simultaneous mirrored volumes with two disks (IM) or three to eight disks (IME), to provide fault-tolerant protection for critical data. (If a hot spare disk is used, the maximum volume size is seven mirrored disks, plus the hot spare disk.) Up to two IM volumes are supported per SAS controller, with up to ten drives total per controller.

If a disk in an Integrated Mirroring volume fails, the hot swap capability allows the volume to be easily restored by simply swapping disks. The firmware then automatically re-mirrors the swapped disk. Additionally, each SAS controller can have one global hot spare disk available to automatically replace a failed disk in the one or two IM or IME volumes configured on the controller. The hot spare makes the Integrated Mirroring volume even more fault-tolerant.

Note

You can configure an Integrated Mirroring volume and an Integrated Striping volume on the same LSI Logic SAS controller

The IM feature uses the same device drivers as the standard LSI Logic Fusion-MPT based controllers, providing seamless and transparent fault tolerance. This eliminates the need for complex backup software or expensive RAID hardware. The IM feature operates independently from the operating system, in order to conserve system resources. The BIOS based configuration utility makes it easy to configure IM and IME volumes.

The Integrated Mirroring feature is currently available as an optional component of the Fusion-MPT architecture on LSI Logic controller products.

5.2.2.2 IM Features

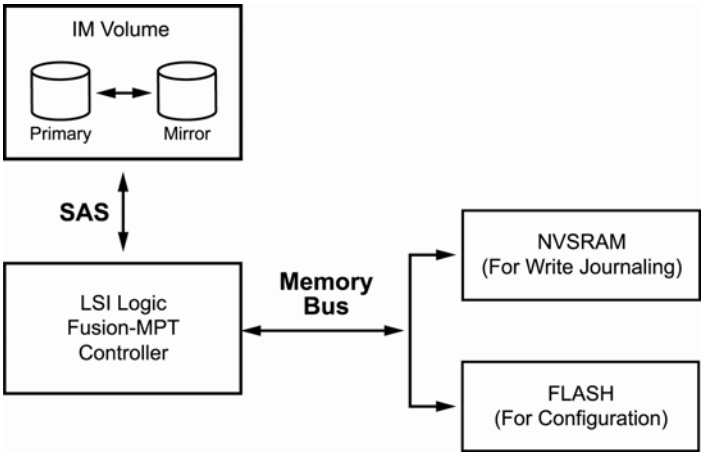
LSI Logic Integrated Mirroring and Integrated Mirroring Enhanced support the following features:

- Configurations of one or two IM or IME volumes on the same LSI Logic SAS controller. Each volume can consist of two mirrored disks (IM) or three to eight mirrored disks (IME).
- (Optional) One global hot spare disk per controller. If a global hot spare disk is defined, the upper limit for an IME volume is seven mirrored disks.
- Mirrored volumes run in optimal mode or in degraded mode (if one mirrored disk fails).
- Hot swap capability.
- Presents a single virtual drive to the OS for each IM/IME volume.
- Supports both SAS and SATA disks, although the two types of disks cannot be combined on the same LSI Logic SAS controller.
- Fusion-MPT architecture.
- Easy-to-use BIOS-based configuration utility (and DOS-based configuration utility for manufacturing use only).
- Error notification: OS-specific event log updated by drivers and errors displayed inside the Fusion-MPT BIOS.
- SES status LED support for Integrated Mirroring disks.
- Write journaling, which allows automatic synchronization of potentially inconsistent data after unexpected power-down situations.
- Metadata used to store volume configuration on mirrored disks.
- Automatic background resynchronization while host I/Os continue.
- Background media verification ensures that data on the IM volume is accessible.

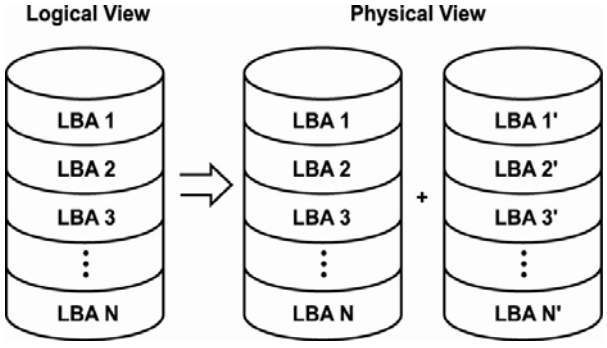
5.2.2.3 IM/IME Description

The LSI Logic Integrated Mirroring (IM) feature supports one or two mirrored volumes on each LSI Logic SAS controller (or one mirrored volume and one Integrated Striping volume). Typically, one of these volumes is the boot volume, as shown in Figure. This is accomplished through the firmware of the LSI Logic SAS controller that supports the standard Fusion-MPT interface. The runtime mirroring of the boot disk is transparent to the BIOS, drivers, and operating system.

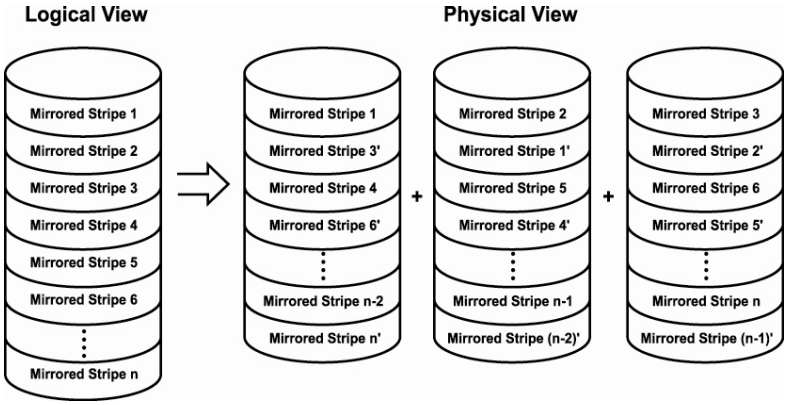
Host-based status software monitors the state of the mirrored disks and reports any error conditions. In Figure, the system is configured with a second disk as a mirror of the first (primary) disk.



The advantage of Integrated Mirroring (RAID 1) is that there is always a mirrored copy of the data. The disadvantage is that writes take longer because data must be written twice. On the other hand, performance is actually improved during reads. Figure shows the logical view and physical view of an Integrated Mirroring configuration with two disks in the mirrored volume.



An IME volume can be configured with up to eight mirrored disks, or seven mirrored disks and a global hot spare. Figure shows the logical view and physical view of an Integrated Mirroring Enhanced (IME) volume with three mirrored disks. Each mirrored stripe is written to a disk and mirrored to an adjacent disk. This type of configuration is also called RAID 1E.



LSI Logic provides the BIOS-based configuration utility to enable the user to create IM and IME volumes during initial setup and to reconfigure them in response to hardware failures or changes in the environment.

5.2.2.4 Integrated Mirroring Firmware

This section describes features of the LSI Logic Integrated Mirroring (IM) firmware, which supports up to two IM volumes per LSI Logic SAS controller.

5.2.2.4.1 Host Interface

The IM host interface uses the Message Passing Interface, as described in the Fusion-MPT Message Passing Interface Specification. Through the Fusion-MPT interface, the host OS has access to the IM volume as well as the physical disks.

5.2.2.4.2 Resynchronization with Concurrent Host I/O Operation

The IM firmware allows Host I/Os to continue on the IM/IME volume while the volume is being re-synchronized in the background. Resynchronization is attempted after a hot spare is activated due to a physical device failure, or after a hot swap has occurred to a physical disk in the IM or IME volume.

5.2.2.4.3 Metadata Support

The firmware supports metadata, which describes the IM/IME logical drive configuration stored on each member disk. When the firmware is initialized, each member disk is queried to read the stored metadata in order to verify the configuration. The usable disk space for each member disk is adjusted down to leave room for this data.

5.2.2.4.4 Hot Swapping

The IM firmware supports hot swapping. The hot-swapped disk is automatically resynchronized in the background, without any host or user intervention. The firmware detects hot swap removal and disk insertion.
Following a hot swap event, the firmware readies the new physical disk by spinning it up and verifying that it has enough capacity for the mirrored volume. The IM firmware resynchronizes all hot-swapped disks that have been removed, even if the same disk is re-inserted. In a two-disk mirrored volume, the IM firmware marks the hot-swapped disk as the secondary disk and marks the other mirrored disk as the primary disk. The firmware resynchronizes all data from the primary disk onto the new secondary disk.

5.2.2.4.5 SMART Support

The IM firmware enables Mode 6 SMART on the member disks in the mirrored volume. Mode 6 SMART requires each physical disk to be polled at regular intervals. If a SMART ASC/ASCQ code is detected on a physical disk in the volume, the firmware processes the SMART data, and the last received SMART ASC/ASCQ is stored in non-volatile memory. The IM/IME volume does not support SMART directly, since it is just a logical representation of the physical disks in the volume.

5.2.2.4.6 Hot Spare Disk

One disk can be configured as a global hot spare disk, which protects data on the one or two volumes configured on the controller. If the IM firmware fails one of the mirrored disks, the firmware automatically replaces it with the hot spare disk. The IM firmware then resynchronizes the mirrored data. The IM firmware is automatically notified when the failed disk has been replaced, and the firmware then designates that disk as the new hot spare.

5.2.2.4.7 Media Verification

The IM firmware supports a background media verification feature that runs at regular intervals when the IM/IME volume is in optimal mode. If the verification command fails for any reason, the other disk's data for this segment is read and written to the failing disk in an attempt to refresh the data. The current Media Verification Logical Block Address is written to non-volatile memory occasionally to allow Media Verification to continue approximately where it left off prior to a power-cycle.

5.2.2.4.8 Disk Write Caching

The IM firmware disables disk write caching by default. This is done to increase data integrity, so that the disk write log stored in NVSRAM is always valid. If disk write caching were enabled (not recommended), the disk write log could be invalid.

5.2.2.4.9 NVSRAM Usage

For the LSISAS1064/1064E and LSISAS1068/1068E controllers, the IM firmware requires at least a 32K NVSRAM in order to perform write journaling. Write journaling is used to verify that the mirrored disks in the IM/IME volume are synchronized with each other.

5.2.2.5 Fusion-MPT Support

The BIOS uses the LSI Logic Fusion-MPT interface to communicate to the SAS controller and firmware to enable Integrated Mirroring. This includes reading the Fusion-MPT configuration to gain access to the parameters that are used to define behavior between the SAS controller and the devices connected to it. The Fusion-MPT drivers for all supported operating systems implement the Fusion-MPT interface to communicate with the controller and firmware.

5.2.3 Creating Integrated Mirroring Volumes

This section describes how to create Integrated Mirroring (IM) and Integrated Mirroring Enhanced (IME) volumes using the LSI Logic SAS BIOS Configuration Utility (SAS BIOS CU).

5.2.3.1 IM Configuration Overview

You can use the SAS BIOS CU to create one or two IM or IME volumes on each LSI Logic SAS controller, with an optional global hot spare disk. All disks in an IM or IME volume must be connected to the same LSI Logic SAS controller.

Although you can use disks of different size in IM and IME volumes, the smallest disk determines the "logical" size of each disk in the volume. In other words, the excess space of the larger member disk is not used.

Refer to Section 2.2, "IM Features," for more information about Integrated Mirroring volumes.

5.2.3.2 Creating IM and IME Volumes

The SAS BIOS CU is part of the Fusion-MPT BIOS. When the BIOS loads during boot and you see the message about the LSI Logic Configuration Utility, press Ctrl-C to start the CU. After you do this, the message changes to:

Please wait, invoking SAS Configuration Utility...

After a brief pause, the main menu of the SAS BIOS CU appears. On some systems, however, the following message appears next:

LSI Logic Configuration Utility will load following initialization!

In this case, the SAS BIOS CU will load after the system has completed its power-on self test.

You can configure one or two IM or IME volumes per Fusion-MPT controller. You can also combine IM, IME, and Integrated Striping volumes on the same controller, up to a maximum of 10 physical disk drives.

The following guidelines also apply when creating an IM or IME volume:

- All physical disks in the volumes must be either SATA (with extended command set support) or SAS (with SMART support). SAS and SATA disks cannot be combined in the same volume.
- Disks must have 512-byte blocks and must not have removable media.
- An IM volume must have two drives, plus an optional global hot spare. An IME volume. An IME volume can have three to eight drives, or three to seven drives if you also create a global hot spare.

Note

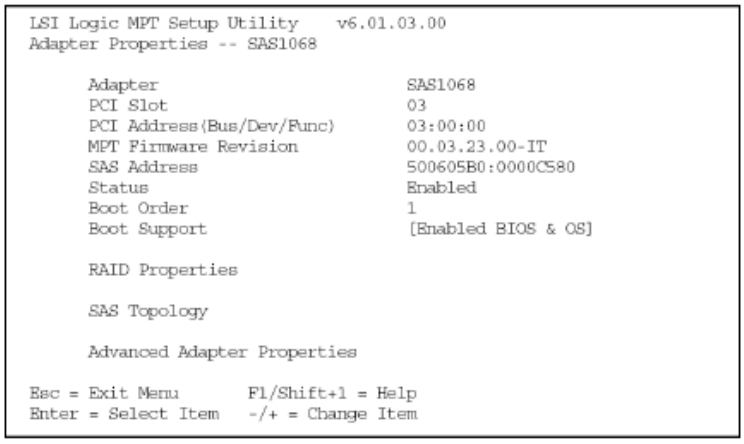
If a disk in an IM or IME volume fails, it is rebuilt on the global hot spare if one is available. So adding a global hot spare greatly increases the level of data protection. (One global hot spare is allowed for the one or two volumes configured on a controller.)

5.2.3.2.1 Creating a Second IM and IME Volume

Follow these steps to create an IM volume with the SAS BIOS CU:

① On the Adapter screen, use the arrow keys to select an LSI Logic SAS adapter.

② Press Enter to go to the Adapter Properties screen, shown in below Figure.



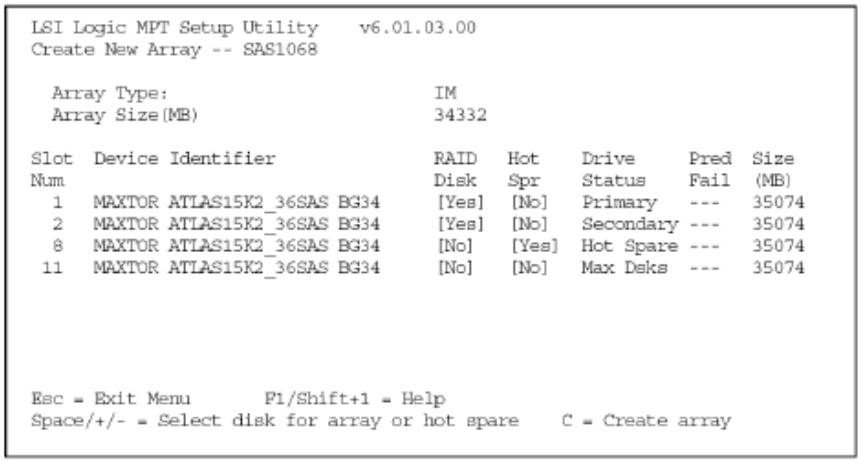
③ On the Adapter Properties screen, use the arrow keys to select RAID Properties on the screen and press Enter.

④ When you are prompted to select a volume type, select Create IM Volume. The Create New Array screen shows a list of disks that can be added to a volume.

⑤ Move the cursor to the "RAID Disk" column and select a disk. To add the disk to the volume, change the "No" to "Yes" by pressing the + key, . key, or space bar. When the first disk is added, the SAS BIOS CU prompts you to either keep existing data or overwrite existing data.

⑥ Press M to keep the existing data on the first disk or press D to overwrite it. If you keep the existing data, this is called a migration. The first disk will be mirrored onto the second disk, so the data you want to keep must be on the first disk added to the volume. Any data on the second disk is overwritten. As disks are added the Array Size field changes to reflect the size of the new volume.

⑦ (Optional) Add a global hot spare by moving the cursor to the hot spare column and pressing the + key, . key, or space bar.


LSI Logic MPT Setup Utility v6.01.03.00
Create New Array -- SAS1068
Array Type: IM
Array Size(MB) 34332
Slot Num Device Identifier RAID Disk Hot Spr Drive Status Pred Fail Size (MB)
1 MAXTOR ATLAS15K2_36SAS BG34 [Yes] [No] Primary --- 35074
2 MAXTOR ATLAS15K2_36SAS BG34 [Yes] [No] Secondary --- 35074
8 MAXTOR ATLAS15K2_36SAS BG34 [No] [Yes] Hot Spare --- 35074
11 MAXTOR ATLAS15K2_36SAS BG34 [No] [No] Max Dsks --- 35074
Esc = Exit Menu F1/Shift+1 = Help
Space/+/- = Select disk for array or hot spare C = Create array

⑧ When the volume has been fully configured, press C and then select Save changes then exit this menu to commit the changes. The SAS BIOS CU pauses while the array is being created.

5.2.3.2.2 Managing Hot Spares

Follow these steps to create an IME volume with the SAS BIOS CU:

① On the Adapter List screen, use the arrow keys to select an LSI Logic SAS adapter.

② Press Enter to go to the Adapter Properties screen, shown in Figure.

③ On the Adapter Properties screen, use the arrow keys to select RAID Properties on the screen and press Enter.

④ When you are prompted to select a volume type, select Create IME Volume. The Create New Array screen shows a list of disks that can be added to a volume.

⑤ Move the cursor to the “RAID Disk” column and select a disk. To add the disk to the volume, change the “No” to “Yes” by pressing the + key, . key, or space bar.

⑥ Repeat this step to select a total of three to eight disks for the volume (or three to seven disks if you will create a global hot spare). All existing data on all the disks you select will be overwritten. As you add disks, the Array Size field changes to reflect the size of the new volume.

⑦ (Optional) Add a global hot spare to the volume by moving the cursor to the hot spare column and pressing the + key, . key, or space bar.

⑧ When the volume has been fully configured, press C and then select Save changes then exit this menu to commit the changes. The SAS BIOS CU pauses while the array is being created.

5.2.3.2.3 Creating s Second IM or IME Volume

The LSI Logic SAS controllers allow you to configure two IM or IME volumes. If one volume is already configured, and if there are available disk drives, there are two ways to add a second volume.

The first is as follows:

① In the configuration utility, select an adapter from the Adapter List. Select the RAID Properties option. This will display the current volume

② Press C to create a new volume.

③ Continue with step 4 of the IM or IME creation procedure in the previous section to create a second volume.

The other way in which to add a second volume is as follows:

① On the Adapter List screen, use the arrow keys to select an LSI Logic SAS adapter.

② Press Enter to go to the Adapter Properties screen, shown in Figure.

③ On the Adapter Properties screen, use the arrow keys to select RAID Properties and press Enter.

④ with step 4 of the IM or IME creation procedure in the previous section to create a second volume.

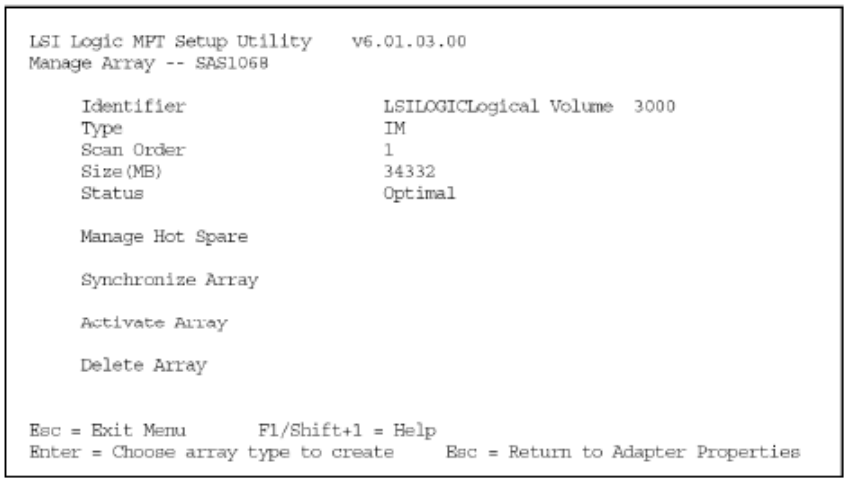
5.2.3.2.4 Managing Hot Spares

You can create one global hot spare disk to protect the one or two IM/IME volumes defined on a SAS controller. Usually, you create the global hot spare at the same time you create the IM/IME volume.

Follow these steps to add a global hot spare disk later for the existing IM/IME volumes on the controller:

① On the View Array screen, select Manage Array.

② Select Manage Hot Spare on the Manage Array screen, shown in below Figure.


LSI Logic MPT Setup Utility v6.01.03.00
Manage Array -- SAS1068
Identifier LSILOGICLogical Volume 3000
Type IM
Scan Order 1
Size(MB) 34332
Status Optimal
Manage Hot Spare
Synchronize Array
Activate Array
Delete Array
Esc = Exit Menu F1/Shift+1 = Help
Enter = Choose array type to create Esc = Return to Adapter Properties

③ Select a disk from the list by pressing the + key, . key, or space bar.

④ After you select the global hot spare disk, press C. An error message appears if the selected disk is not at least as large as the smallest disk used in the IM/IME volume(s). The global hot spare disk must have 512-byte blocks, it cannot have removable media, and the disk type must be either SATA with extended command set support or SAS with SMART support. If SATA disks are used for the IM/IME volume(s), the hot spare disk must also be a SATA disk. If SAS disks are used, the hot spare disk must also be a SAS disk. An error message appears if the selected disk is not the same type as the disks used in the IM/IME volumes.

⑤ Select Save changes then exit this menu to commit the changes. The configuration utility will pause while the global hot spare is being added.

Follow these steps to delete a global hot spare:

① Select Manage Hot Spare on the Manage Array screen.

② Select Delete Hot Spare and then press C.

③ Select Save changes then exit this menu to commit the changes. The configuration utility will pause while the global hot spare is being removed.

5.2.3.3 Other Configuration Tasks

This section explains how to do other tasks related to configuring and maintaining IM and IME volumes.

5.2.3.3.1 Viewing Volume Properties

Follow these steps to view the properties of volumes:

①In the SAS BIOS CU, select an adapter from the Adapter List. Select the RAID Properties option.
The properties of the current volume are displayed. If a global hot spare is defined, it is also listed.

Note

If you create one volume using SAS disks, another volume using SATA disks, and a global hot spare disk, the hot spare disk will only appear when you view the volume that has the same type of disks as the hot spare disk.

② If two volumes are configured, press Alt+N to view the other array.

③ To manage the current array, select the Manage Array item and press Enter.

5.2.3.3.2 Synchronizing an Array

The Synchronize Array command forces the firmware to resynchronize the data on the mirrored disks is the array. It is seldom necessary to use this command, because the firmware automatically keeps the mirrored data synchronized during normal system operation. When you use this command, one disk of the array is placed in the Degraded state until the data on the mirrored disks has been resynchronized.

Follow these steps to force the synchronization of a selected array:

① Select Synchronize Array on the Manage Array screen.

② Press Y to start the synchronization, or N to cancel it.

5.2.3.3.3 Activating an Array

An array can become inactive if, for example, it is removed from one controller or computer and moved to another one. The “Activate Array” option allows you to reactivate an inactive array that has been added to a system. This option is only available when the selected array is currently inactive.

Follow these steps to activate a selected array

① Select Activate Array on the Manage Array screen.

② Press Y to proceed with the activation, or press N to abandon it. After a pause, the array will become active.

Note

If there is a global hot spare disk on the controller to which you have moved the array, the firmware checks when you activate the array to determine if the hot spare is compatible with the new array. An error message appears if the disks in the activated array are larger than the hot spare disk or if the disks in the activated array are not the same type as the hot spare disk (SATA versus SAS).

5.2.3.3.4 Deleting an Array

CAUTION

Before deleting an array, be sure to back up all data on the array that you want to keep.

Follow these steps to delete a selected array:

① Select Delete Array on the Manage Array screen.

② Press Y to delete the array.

After a pause, the firmware deletes the array. If there is another remaining array and a global hot spare disk, the firmware checks the hot spare disk to determine if it is compatible with the remaining array. If the hot spare disk is not compatible (too small or wrong disk type) the firmware deletes it also.

Note

After a volume has been deleted, it cannot be recovered. When a RAID 1 volume is deleted, the data is preserved on the primary disk. The master boot records (MBR) of other disks in the array are deleted. For other RAID types, the master boot records of all disks are deleted.

5.2.3.3.5 Locating a Disk Drive, or Multiple Disk Drives in a Volume

You can use the SAS BIOS CU to locate and identify a specific physical disk drive by flashing the drive’s LED. You can also use the SAS BIOS CU to flash the LEDs of all the disk drives in a RAID volume. There are several ways to do this:

- When you are creating an IM or IME volume, and a disk drive is set to Yes as part of the volume, the LED on the disk drive is flashing. The LED is turned off when you have finished creating the volume.
- You can locate individual disk drives from the SAS Topology screen. To do this, move the cursor to the name of the disk in the Device Identifier column and press Enter. The LED on the disk flashes until the next key is pressed.
- You can locate all the disk drives in a volume by selecting the volume on the RAID Properties screen. The LEDs flash on all disk drives in the volume.

Note

The LEDs on the disk drives will flash as described above if the firmware is correctly configured and the drives or the disk enclosure supports disk location.

5.2.3.3.6 Selecting a Boot Disk

You can select a boot disk in the SAS Topology screen. This disk is then moved to scan ID 0 on the next boot, and remains at this position. This makes it easier to set BIOS boot device options and to keep the boot device constant during device additions and removals. There can be only one boot disk.

Follow these steps to select a boot disk:

① In the SAS BIOS CU, select an adapter from the Adapter List.

② Select the SAS Topology option.
The current topology is displayed. If the selection of a boot device is supported, the bottom of the screen lists the Alt+B option. This is the key for toggling the boot device. If a device is currently configured as the boot device, the Device Info column on the SAS Topology screen will show the word “Boot.”

③ To select a boot disk, move the cursor to the disk and press Alt+B.

④ To remove the boot designator, move the cursor down to the current boot disk and press Alt+B. This controller will no longer have a disk designated as boot.

⑤ To change the boot disk, move the cursor to the new boot disk and press Alt+B. The boot designator will move to this disk.

Note

The firmware must be configured correctly in order for the Alt+B feature to work.

5.2.4 Integrated Striping Overview

This section provides an overview of the LSI Logic Integrated Striping (IS) feature.

5.2.4.1 Introduction

The LSI Logic Integrated Striping (IS) feature is useful for applications that require the faster performance and increased storage capacity of striping. The low-cost IS feature has many of the advantages of a more expensive RAID striping solution. A single IS logical drive may be configured as the boot disk or as a data disk.

The IS feature is implemented with controller firmware that supports the Fusion-MPT Interface. IS provides better performance and more capacity than individual disks, without burdening the host CPU. The firmware splits host I/Os over multiple disks and presents the disks as a single logical drive. In general, striping is transparent to the BIOS, the drivers, and the operating system.

The SAS BIOS CU is used to configure IS volumes, which can consist of two to eight disks.

Note
Integrated Mirroring and Integrated Striping volumes can be configured on the same LSI logic SAS controller.

5.2.4.2 IS Features

Integrated Striping supports the following features:

- Support for volumes with two to eight drives
- Support for two IS volumes, with up to 10 drives total, on a controller. An IS volume can also be combined with an IM or IME volume.

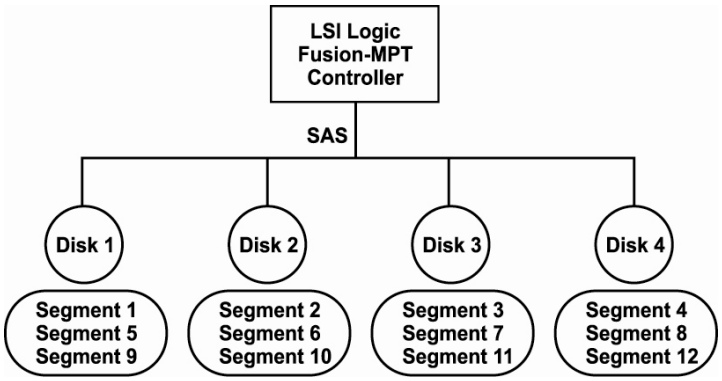
Note
Currently available LSI Logic SAS controllers support a maximum of eight drives.
All drives in a volume must be connected to the same SAS controller.

- Presents a single virtual drive to the OS for each configured volume
- Support for both SAS and SATA drives, although the two types of drives cannot be combined in one volume
- Fusion-MPT architecture
- Easy-to-use SAS BIOS configuration utility
- Error notification
- Use of metadata to store volume configuration on disks
- OS-specific event log
- Error display inside the Fusion-MPT BIOS
- SES status LED support for drives used in IS volumes

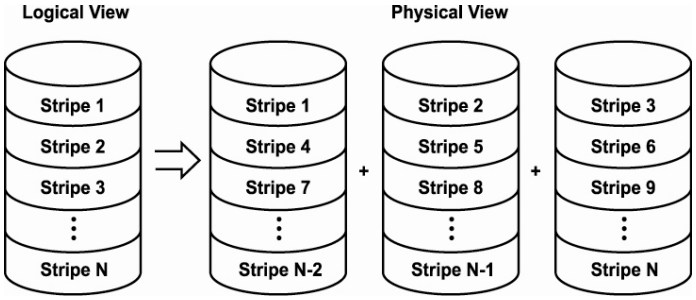
5.2.4.3 IS Description

The IS feature writes data across multiple disks instead of onto one disk. This is accomplished by partitioning each disk's storage space into 64 Kbyte stripes. These stripes are interleaved round-robin, so that the combined storage space is composed alternately of stripes from each disk.

For example, as shown in Figure, segment 1 is written to disk 1, segment 2 is written to disk 2, segment 3 is written to disk 3, and so on. When the system reaches the end of the disk list, it continues writing data at the next available segment of disk



Below Figure shows a logical view and a physical view of Integrated Striping configuration.



The primary advantage of IS is speed, because it transfers data to or from multiple disks at once. However, there is no data redundancy; therefore, if one disk fails, that data is lost.

5.2.4.4 Integrated Striping Firmware

This section describes features of the LSI Logic Integrated Striping (IS) firmware.

5.2.4.4.1 Host Interface

The IS host interface uses the Message Passing Interface, as described in the Fusion-MPT Message Passing Interface Specification, including Integrated Striping. Through the Fusion-MPT interface, the host operating system has access to the logical IS drive as well as the physical disks.

5.2.4.4.2 Metadata Support

The firmware supports metadata, which describes the IS logical drive configuration stored on each member disk. When the firmware is initialized, each member disk is queried to read the stored metadata to verify the configuration. The usable disk space for each IS member disk is adjusted down to leave room for this data.

5.2.4.4.3 SMART Support

The IS firmware enables Mode 6 SMART on the IS member disks. Mode 6 SMART requires each physical disk to be polled at regular intervals. If a SMART ASC/ASCQ code is detected on a physical IS disk, the firmware processes the SMART data, and the last received SMART ASC/ASCQ is stored in non-volatile memory. The IS volume does not support SMART directly, since it is just a logical representation of the physical disks in the volume.

5.2.4.4.4 Disk Write Caching

Disk write caching is disabled by default on all IS volumes.

5.2.4.5 Fusion-MPT Support

The BIOS uses the LSI Logic Fusion-MPT interface to communicate to the SAS controller and firmware to enable Integrated Striping. This includes reading the Fusion-MPT configuration to gain access to the parameters that are used to define behavior between the SAS controller and the devices connected to it. The Fusion-MPT drivers for all supported operating systems implement the Fusion-MPT interface to communicate with the controller and firmware.

5.2.5 Creating Integrated Striping Volumes

This section describes how to create Integrated Striping (IS) volumes using the LSI Logic SAS BIOS Configuration Utility (SAS BIOS CU).

5.2.5.1 Configuration Overview

You can use the SAS BIOS CU to create multiple IS volumes, with up to 10 drives total on an LSI Logic SAS controller. Each volume can have from 2 to 8 drives. Disks in an IS volume must be connected to the same LSI Logic SAS controller, and the controller must be in the BIOS boot order.

Although you can use disks of different size in IS volumes, the smallest disk determines the “logical” size of each disk in the volume. In other words, the excess space of the larger member disk is not used. Usable disk space for each disk in an IS volume is adjusted down to leave room for metadata. Usable disk space may be further reduced to maximize the ability to interchange disks in the same size classification. The supported stripe size is 64 Kbytes.

Refer to Section 4.2, “IS Features,” for more information about Integrated Striping volumes.

5.2.5.2 Creating IS Volumes

The SAS BIOS CU is part of the Fusion-MPT BIOS. When the BIOS loads during boot and you see the message about the Setup Utility, press Ctrl-C to start it. After you do this, the message changes to:

Please wait, invoking SAS Configuration Utility...

After a brief pause, the main menu of the SAS BIOS CU appears. On some systems, however, the following message appears next:

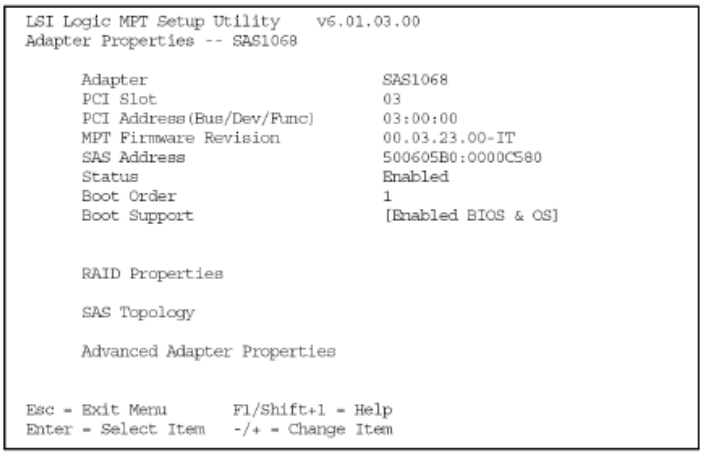
LSI Logic Configuration Utility will load following initialization!

In this case, the SAS BIOS CU will load after the system has completed its power-on self test.

Follow the steps below to configure an Integrated Striping (IS) volume with the SAS BIOS CU. The procedure assumes that the required controller(s) and disks are already installed in the computer system. You can configure both IM and IS volumes on the same SAS controller.

① On the Adapter List screen of the SAS BIOS CU, use the arrow keys to select a SAS adapter.

② Press Enter to go to the Adapter Properties screen, shown in Figure.



③ On the Adapter Properties screen, use the arrow keys to select RAID Properties on the screen and press Enter.

④ When you are prompted to select a volume type, select Create IS Volume. The Create New Array screen shows a list of disks that can be added to a volume.

⑤ Move the cursor to the “RAID Disk” column. To add a disk to the volume, change the “No” to “Yes” by pressing the + key, . key, or space bar. As disks are added, the Array Size field changes to reflect the size of the new volume.

There are several limitations when creating an IS (RAID 0) volume:

- All disks must be either SATA (with extended command set support) or SAS (with SMART support).
- Disks must have 512-byte blocks and must not have removable media.
- There must be at least 2 and no more than 8 drives in a valid IS volume. Hot spare drives are not allowed.

⑥ When the volume has been fully configured, press C and then select Save changes then exit this menu to commit the changes. The configuration utility will pause while the array is being created.

Note

Integrated Striping does not provide any data protection in the event of disk failure. It is primarily used to increase speed.

5.2.5.3 Creating a Second IS Volume

The LSI Logic SAS controllers allow you to configure two IS volumes, or an IS volume and an IM or IME volume. If one volume is already configured, and if there are available disk drives, there are two ways to add a second volume.

The first is as follows:

① In the configuration utility, select an adapter from the Adapter List. Select the RAID Properties option. This will display the current volume.

② Press C to create a new volume.

③ Continue with step 4 of Section 5.2, “Creating IS Volumes,” to create a second IS volume.

The other way in which to add a second volume is as follows:

① On the Adapter List screen, use the arrow keys to select an LSI Logic SAS adapter.

② Press Enter to go to the Adapter Properties screen, shown in upper Figure.

③ On the Adapter Properties screen, use the arrow keys to select RAID Properties and press Enter.

④ Continue with step 4 of the IS creation procedure in the previous section to create a second volume.

5.2.5.4 Other Configuration Tasks

This section explains how to do other tasks related to configuring and maintaining IS volumes.

5.2.5.4.1 Viewing IS Volume Properties

Follow these steps to view the properties of IS volumes:

① In the configuration utility, select an adapter from the Adapter List. Select the RAID Properties option. The properties of the current volume are displayed.

② If more than one volume is configured, press Alt+N to view the next array.

③ To manage the current array, press Enter when the Manage Array item is selected.

5.2.5.4.2 Activating an Array

An array can become inactive if, for example, it is removed from one controller or computer and moved to another one. The “Activate Array” option allows you to reactivate an inactive array that has been added to a system. This option is only available when the selected array is currently inactive.

Follow these steps to activate a selected array.

① Select Activate Array on the Manage Array screen.

② Press Y to proceed with the activation, or press N to abandon it. After a pause, the array will become active.

5.2.5.4.3 Deleting an Array

CAUTION

Before deleting an array, be sure to back up all data on the array that you want to keep.

Follow these steps to delete a selected array:

① Select Delete Array on the Manage Array screen.

② Press Y to delete the array, or press N to abandon the deletion. After a pause, the firmware deletes the array.

Note

Once a volume has been deleted, it cannot be recovered. The master boot records of all disks are deleted.

5.2.5.4.4 Locating a Disk Drive, or Multiple Disk Drives in a Volume

You can use the SAS BIOS CU to locate and identify a specific physical disk drive by flashing the drive's LED. You can also use the SAS BIOS CU to flash the LEDs of all the disk drives in a RAID volume. There are several ways to do this:

- When you are creating an IS volume, and a disk drive is set to Yes as part of the volume, the LED on the disk drive is flashing. The LED is turned off when you have finished creating the volume.
- You can locate individual disk drives from the SAS Topology screen. To do this, move the cursor to the name of the disk in the Device Identifier column and press Enter. The LED on the disk flashes until the next key is pressed.
- You can locate all the disk drives in a volume by selecting the volume on the RAID Properties screen. The LEDs flash on all disk drives in the volume.

Note

The LEDs on the disk drives will flash as described above if the firmware is correctly configured and the drives or the disk enclosure supports disk location.

5.2.5.4.5 Selecting a Boot Disk

You can select a boot disk in the SAS Topology screen. This disk is then moved to scan ID 0 on the next boot, and remains at this position. This makes it easier to set BIOS boot device options and to keep the boot device constant during device additions and removals. There can be only one boot disk.

Follow these steps to select a boot disk:

① In the SAS BIOS CU, select an adapter from the Adapter List.

② Select the SAS Topology option.

The current topology is displayed. If the selection of a boot device is supported, the bottom of the screen lists the Alt+B option. This is the key for toggling the boot device. If a device is currently configured as the boot device, the Device Info column on the SAS Topology screen will show the word "Boot."

③ To select a boot disk, move the cursor to the disk and press Alt+B.

④ To remove the boot designator, move the cursor down to the current boot disk and press Alt+B. This controller will no longer have a disk designated as boot.

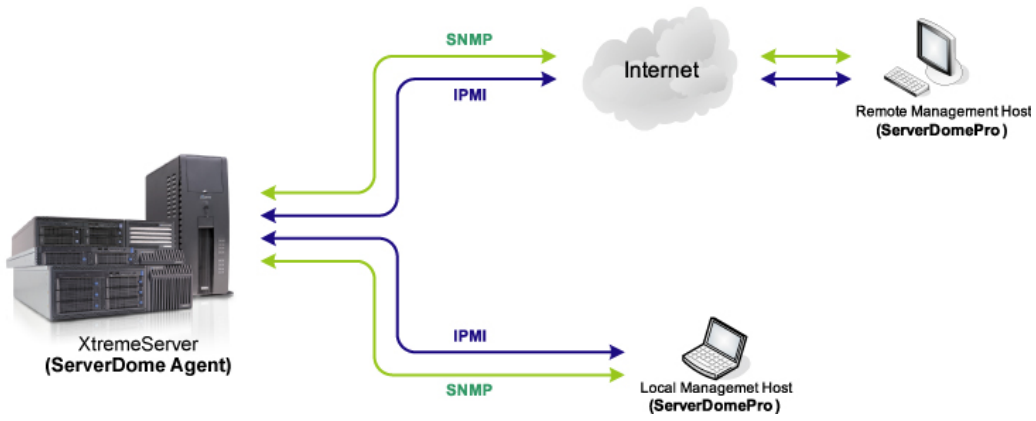
⑤ To change the boot disk, move the cursor to the new boot disk and press Alt+B. The boot designator will move to this disk.

Note

The firmware must be configured correctly in order for the Alt+B feature to work.

5.3 ServerDome Overview

The ServerDome provides remote server management for the XtremeServer 1U and 3U XtremeServer.
With comprehensive management capabilities from a single graphical console, ServerDome remote management software automates and simplifies IT and networking tasks, letting the system administrator deploy, configure, manage and maintain X number of servers. The ServerDome remote management capabilities are IPMI 2.0 compliant and work with either Windows or Linux.



Key Features

- Easy to set up and manage
- Provides graphic user interface
- Failure notifications with customized e-mail and popup message.
- Provides remote management capabilities through SNMP and IPMI.
- System HW resource real-time monitoring
- System OS resource real-time monitoring

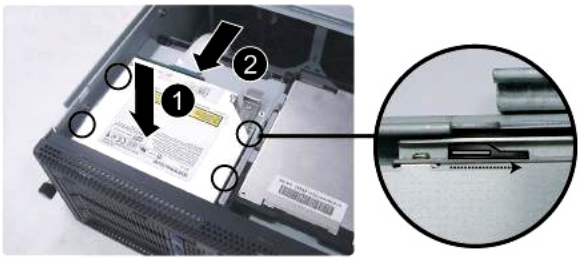
NOTICE
For details, please refer to the ServerDome manual which included ServerDome CD.

1. Removing & Installing System Components

1.1 Installing the CD-ROM Drive

① Screw two brackets and the interface board to the CD-ROM.

② Locate the CD-ROM kit right into the place on the chassis and then slide it forward.



③ Push the lock tension down to secure the CD-ROM kit.

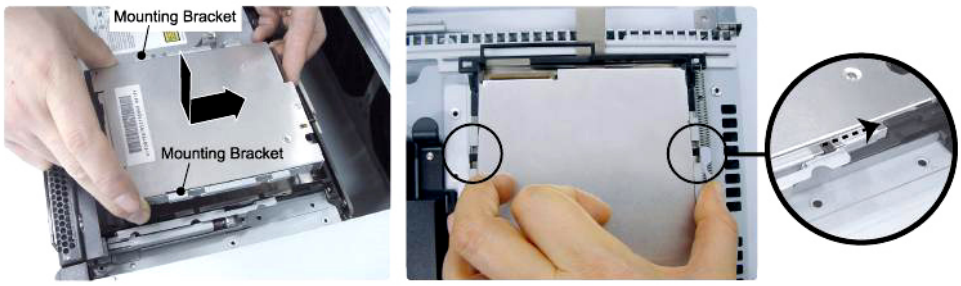
④ Install the FFC(Flexible Flat Cable) of CD-ROM drive.

CAUTION
Face the conduct side down and lock the connector to secure the cable.
Do not treat the connector by force.

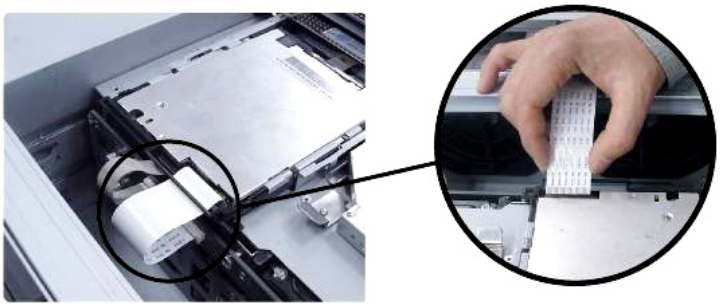
1.2 Installing the Floppy Disk Drive

① Install the FDD with two mounting bracket.

② Install the FDD with two mounting brackets in the plastic housing as shown below.



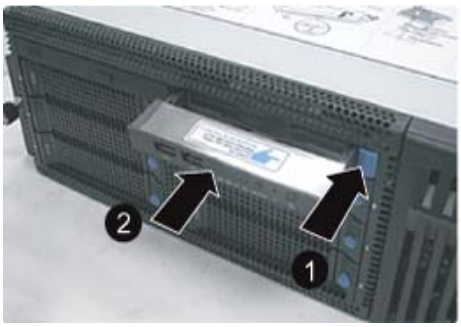
③ Install the FDD cable to backplane.



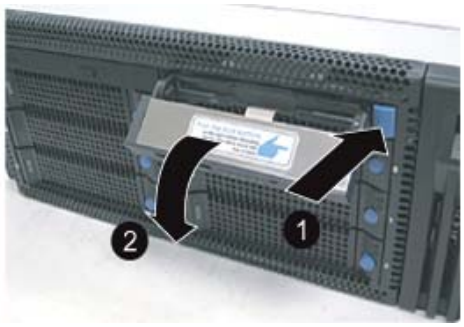
CAUTION
Face the conduct side up and lock the connector to secure the cable.
Do not treat the connector by force.

④ Push the button and slide the front LED panel back into the system.

To use the FDD, push the blue button and it will come up to the front.



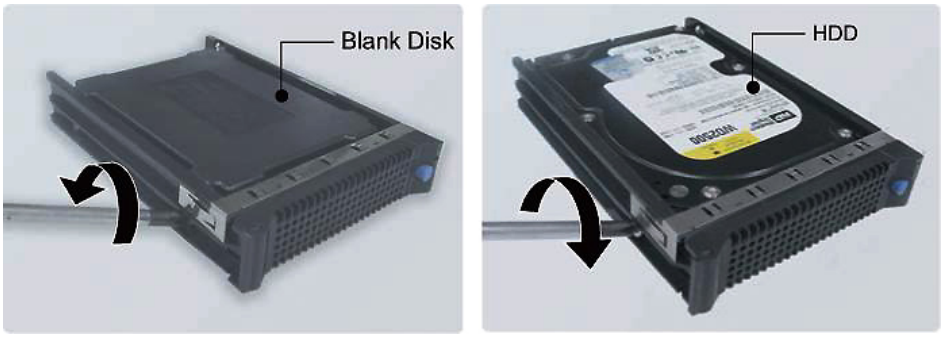
Close the FDD



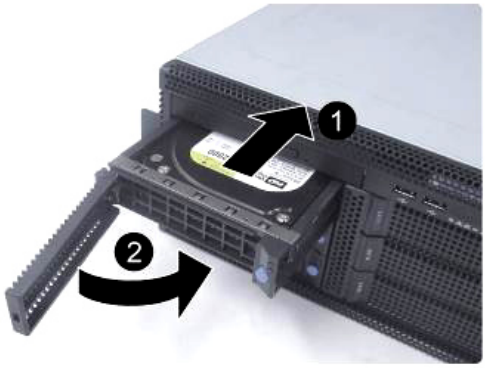
Use the FDD

1.3 Installing the Hard Disk Drive

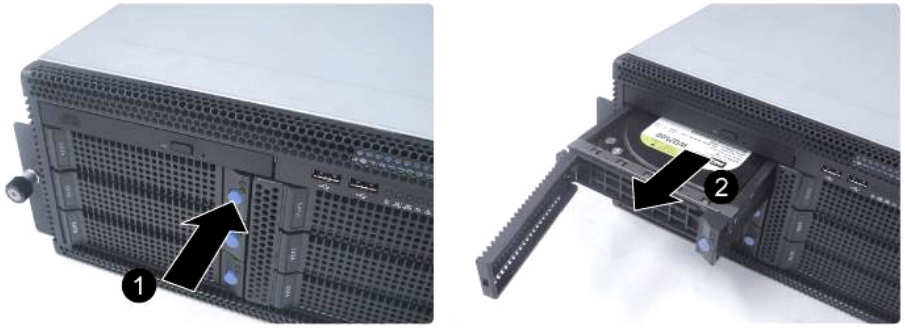
① Remove the blank disk from the disk carrier and secure HDD to the carrier with four screws. Keep the blank disk for the future use.



② Insert the disk carrier into the bay and then close the handle to lock.



③ Removing the HDD carrier: push the release button of the carrier and gently pull the drive carrier outward.



1.4 Removing the Power Supply Unit

CAUTION
In replacing the power supply, handle the unit with care because it is heavy.

① Push the release button on the right side of the front bezel and remove it.

② With the handle held, release the locking latch.

③ Pull out the power supply.

1.5 Replacing the Cooling Fan Unit

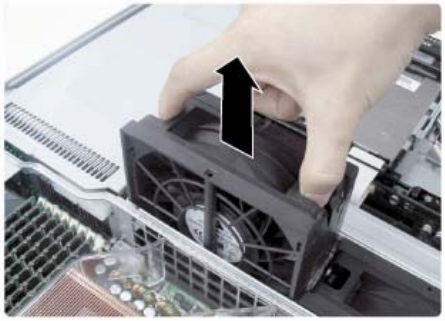
WARNING

Do not remove the fan module while operating the system.
In installing the fan module, carefully set the unit on the fan connector.

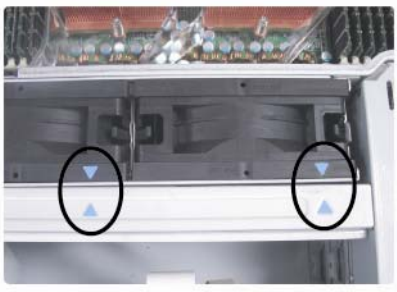
1.5.1 Center Fan Unit

① Push both latches of the fan module.

② Lift the fan module upward and set it away from the system.

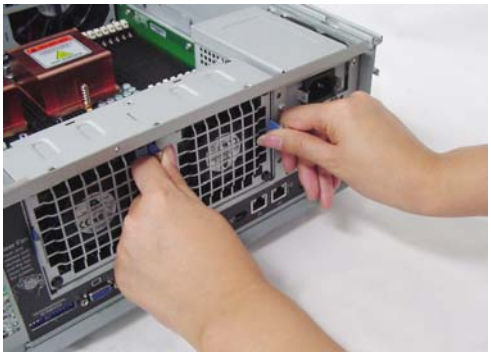


③ Locate the fan module on the chassis and align arrow mark with that on chassis. Push the fan module carefully down.

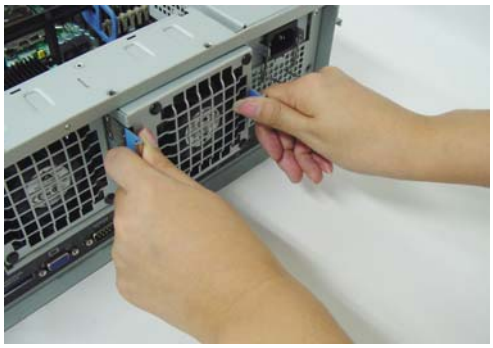


1.5.2 Rear Fan Unit

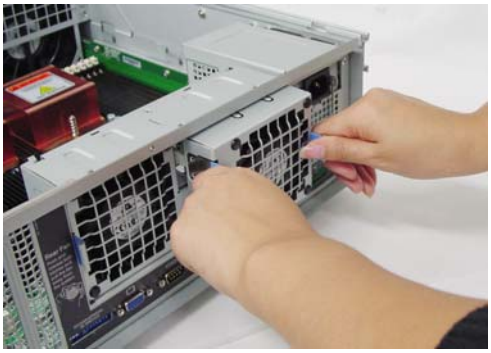
① Push both latches of the fan module.



② Pull the fan module out and set it away from the system.



③ Locate the fan module on the locking guide of the chassis.



④ Push the fan module in carefully.

1.6 Replacing the Interface Unit

1.6.1 Backplane Unit

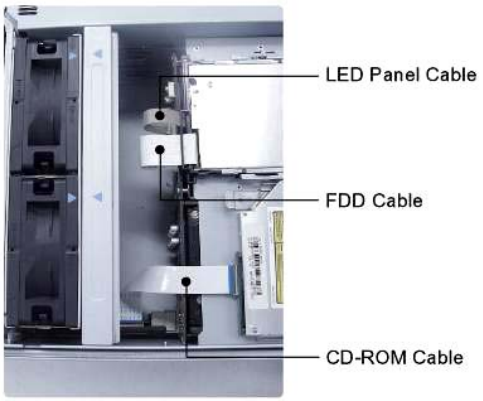
CAUTION

Before installing IFB, remove HDD carrier and locate FDD forward.

① Slide down the backplane board along the holding guide.

② Secure backplane board with two screws.

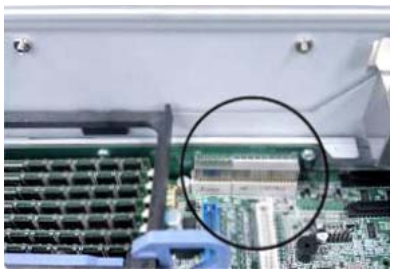
③ Install the FDD and Front LED cables to the backplane.



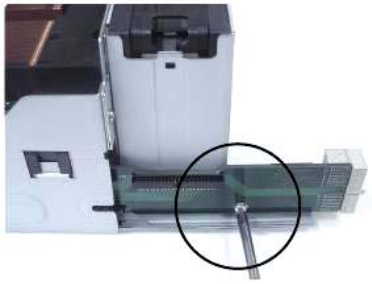
1.6.2 Interface Board(IFB) Unit

① Secure the interface board with bracket.

Install Z-PACK connector into a connector of the motherboard.



② Install the interface unit into the chassis and secure it with three screws.



1.6.3 Center FAN Cage Unit

Secure the center fan cage to cage rear with the two screws after aligning fan connector of fan board with header of motherboard.

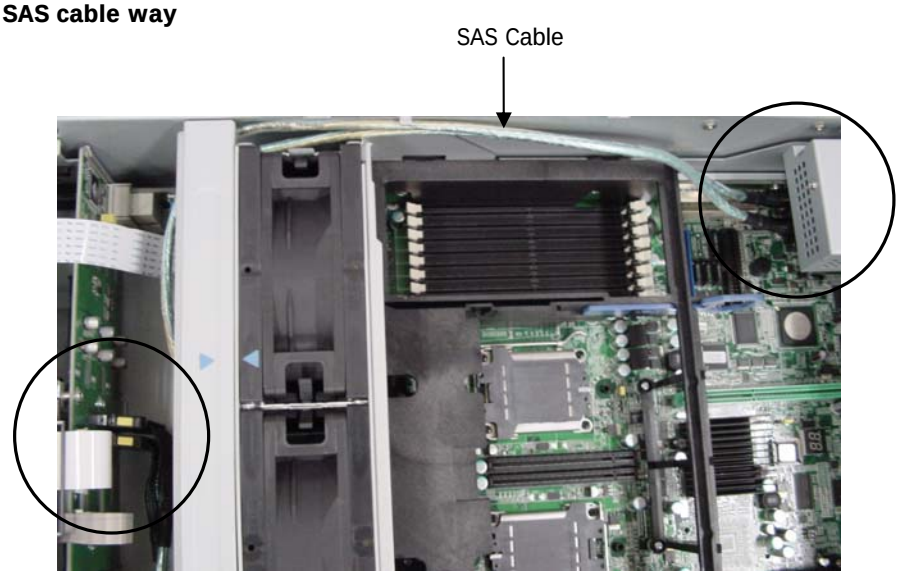
1.6.4 SAS Cable

WARNING

Routing SAS cable should be prior to installing Interface unit.

1.6.4.1 Using Onboard SAS Controller

SAS cable way

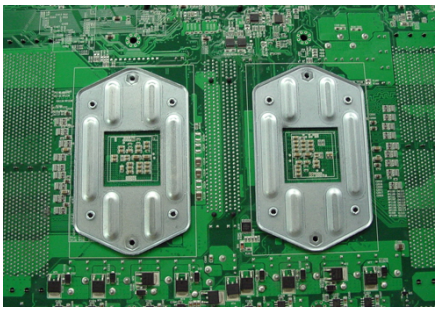


1.7 Installing the Motherboard

CAUTION

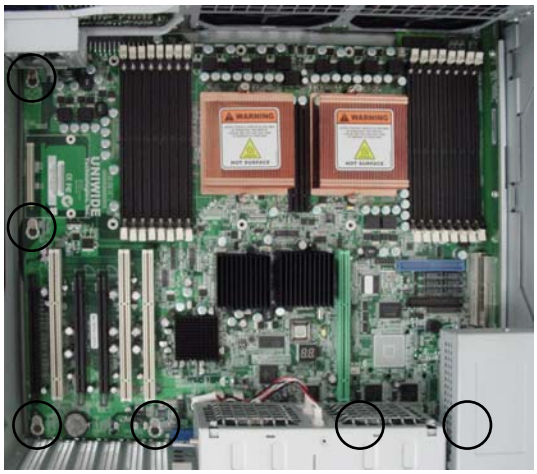
In order to remove or install the motherboard, disassemble the rear cage unit from the system beforehand.

① Attach two heatsink back plates on the bottom side of motherboard.



② Place the motherboard on the key hole standoffs of the chassis so that each of the six mounting holes fit into the key hole standoffs.

Secure the motherboard on the chassis with the screws.



CAUTION

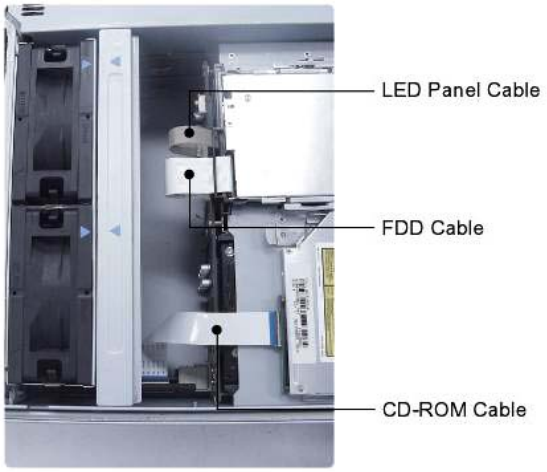
Insert the front side of motherboard into the chassis first. In placing the motherboard, check the ID LED's hole.

1.8 Installing the Rear Cage Unit

① Push slowly Cage Rear into a chassis until making a click sound.

② Check the Latch rear cage locking.

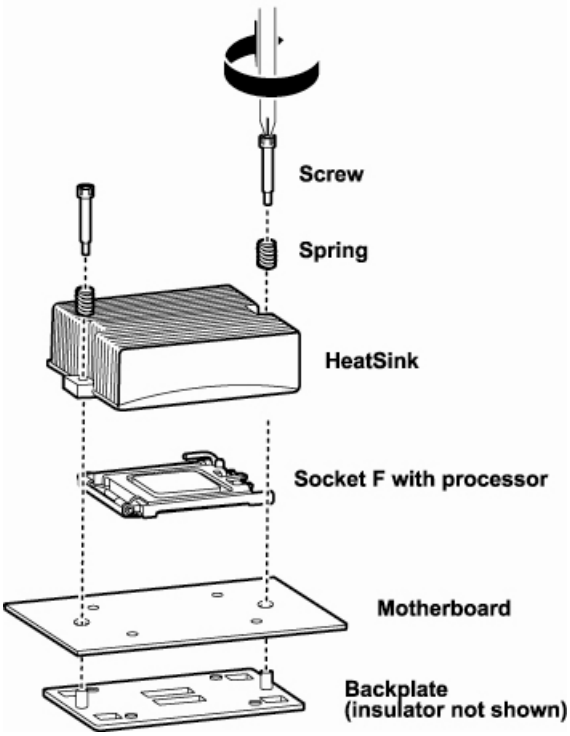
③ Install the cable for FDD, front LED panel and CD-ROM drive.



1.9 Installing the CPU Heatsink

CAUTION

Make sure that thermal interface material should be on the bottom side of the heatsink.

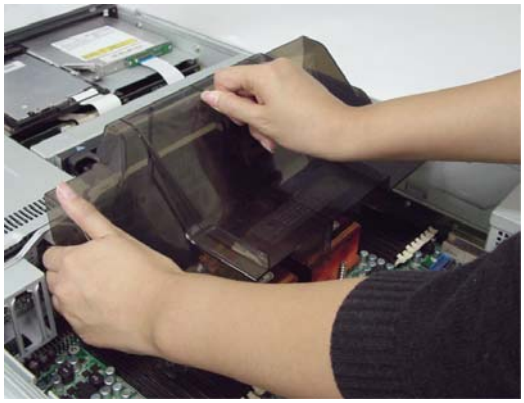


1.10 Installing the Air Duct

CAUTION

Do not press memory socket handle down while inserting memory plenum, which could lift up memory.

① Align the air duct with the guide of the chassis and put it on top of the motherboard.



② Push it down and carefully check whether it is secured.

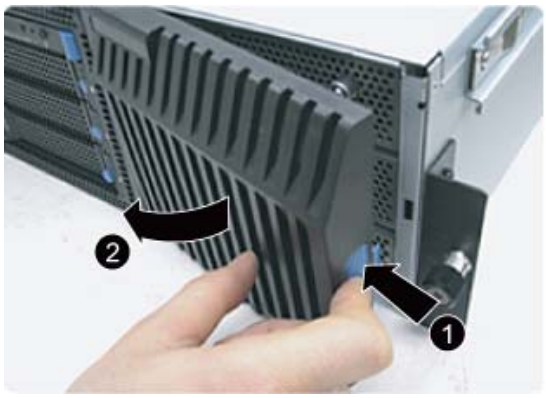
③ In order to remove the air duct, hold the hand guide of duct and remove it away from the system with care.

1.11 Installing the Front Bezel

① Locate the front bezel on the chassis as shown below.

② hole of chassis and press right parts of bezel to secure it.

③ In order to remove the bezel, press Push button and Pull it out.



Appendix

A. BIOS Post Code

AMIBIOS8 Check Point and Beep Code List

The POST code checkpoints are the largest set of checkpoints during the BIOS pre-boot process. The following table describes the type of checkpoints that may occur during the POST portion of the BIOS.

Checkpoint	Description
Before D0	If boot block debugger is enabled, CPU cache-as-RAM functionality is enabled at this point. Stack will be enabled from this point.
D1	Early super I/O initialization is done including RTC and keyboard controller. Serial port is enabled at this point if needed for debugging. NMI is disabled. Perform keyboard controller BAT test. Save power-on CPUID value in scratch CMOS. Go to flat mode with 4GB limit and GA20 enabled.
D2	Verify the boot block checksum. System will hang here if checksum is bad.
D3	Disable CACHE before memory detection. Execute full memory sizing module. If memory sizing module not executed, start memory refresh and do memory sizing in Boot block code. Do additional chipset initialization. Re-enable CACHE. Verify that flat mode is enabled.
D4	Test base 512KB memory. Adjust policies and cache first 8MB. Set stack.
D5	Bootblock code is copied from ROM to lower system memory and control is given to it. BIOS now executes out of RAM. Copies compressed boot block code to memory in right segments. Copies BIOS from ROM to RAM for faster access. Performs main BIOS checksum and updates recovery status accordingly.
D6	Both key sequence and OEM specific method is checked to determine if BIOS recovery is forced. If BIOS recovery is necessary, control flows to checkpoint E0. See Bootblock Recovery Code Checkpoints section of document for more information.
D7	Restore CPUID value back into register. The Bootblock-Runtime interface module is moved to system memory and control is given to it. Determine whether to execute serial flash.
D8	The Runtime module is uncompressed into memory. CPUID information is stored in memory.
D9	Store the Uncompressed pointer for future use in PMM. Copying Main BIOS into memory. Leaves all RAM below 1MB Read-Write including E000 and F000 shadow areas but closing SMRAM.
DA	Restore CPUID value back into register. Give control to BIOS POST (ExecutePOSTKernel). See POST Code Checkpoints section of document for more information.
DC	System is waking from ACPI S3 state.
03	Disable NMI, Parity, video for EGA, and DMA controllers. Initialize BIOS, POST, Runtime data area. Also initialize BIOS modules on POST entry and GPNV area. Initialized CMOS as mentioned in the Kernel Variable "wCMOSFlags."

04	Check CMOS diagnostic byte to determine if battery power is OK and CMOS checksum is OK. Verify CMOS checksum manually by reading storage area. If the CMOS checksum is bad, update CMOS with power-on default values and clear passwords. Initialize status register A. Initializes data variables that are based on CMOS setup questions. Initializes both the 8259 compatible PICs in the system.
05	Initializes the interrupt controlling hardware(generally PIC) and interrupt vector table.
06	Do R/W test to CH-2 count reg. Initialize CH-0 as system timer. Install the POSTINT1Ch handler. Enable IRQ-0 in PIC for system timer interrupt. Traps INT1Ch vector to "POSTINT1ChHandlerBlock."
08	Initializes the CPU. The BAT test is being done on KBC. Program the keyboard controller command byte is being done after Auto detection of KB/MS using AMI KB-5.
C0	Early CPU Init Start -- Disable Cache - Init Local APIC
C1	Set up boot strap processor Information
C2	Set up boot strap processor for POST
C5	Enumerate and set up application processors
C6	Re-enable cache for boot strap processor
C7	Early CPU Init Exit
0A	Initializes the 8042 compatible Key Board Controller.
0B	Detects the presence of PS/2 mouse.
0C	Detects the presence of Keyboard in KBC port.
0E	Testing and initialization of different Input Devices. Also, update the Kernel Variables. Traps the INT09h vector, so that the POST INT09h handler gets control for IRQ1. Uncompress all available language, BIOS logo, and Silent logo modules.
13	Early POST initialization of chipset registers.
24	Uncompress and initialize any platform specific BIOS modules.
30	Initialize System Management Interrupt.
2A	Initializes different devices through DIM. See DIM Code Checkpoints section of document for more information.
2C	Initializes different devices. Detects and initializes the video adapter installed in the system that have optional ROMs.
2E	Initializes all the output devices.
31	Allocate memory for ADM module and uncompress it. Give control to ADM module for initialization. Initialize language and font modules for ADM. Activate ADM module.
33	Initializes the silent boot module. Set the window for displaying text information.
37	Displaying sign-on message, CPU information, setup key message, and any OEM specific information.
38	Initializes different devices through DIM. See DIM Code Checkpoints section of document for more information.
39	Initializes DMAC-1 & DMAC-2.
3A	Initialize RTC date/time.
3B	Test for total memory installed in the system. Also, Check for DEL or ESC keys to limit memory test. Display total memory in the system.
3C	Mid POST initialization of chipset registers.
40	Detect different devices (Parallel ports, serial ports, and coprocessor in CPU, ... etc.) successfully installed in the system and update the BDA, EBDA...etc.

50	Programming the memory hole or any kind of implementation that needs an adjustment in system RAM size if needed.
52	Updates CMOS memory size from memory found in memory test. Allocates memory for Extended BIOS Data Area from base memory.
60	Initializes NUM-LOCK status and programs the KBD type matic rate.
75	Initialize Int-13 and prepare for IPL detection.
78	Initializes IPL devices controlled by BIOS and option ROMs.
7A	Initializes remaining option ROMs.
7C	Generate and write contents of ESCD in NVRam.
84	Log errors encountered during POST.
85	Display errors to the user and gets the user response for error.
87	Execute BIOS setup if needed / requested.
8C	Late POST initialization of chipset registers.
8D	Build ACPI tables (if ACPI is supported)
8E	Program the peripheral parameters. Enable/Disable NMI as selected
90	Late POST initialize of system management interrupt.
A0	Check boot password if installed.
A1	Clean-up work needed before booting to OS.
A2	Takes care of runtime image preparation for different BIOS modules. Fill the free area in F000h segment with 0FFh. Initializes the Microsoft IRQ Routing Table. Prepares the runtime language module. Disables the system configuration display if needed.
A4	Initialize runtime language module.
A7	Displays the system configuration screen if enabled. Initialize the CPU's before boot, which includes the programming of the MTRR's.
A8	Prepare CPU for OS boot including final MTRR values.
A9	Wait for user input at configuration display if needed.
AA	Uninstall POST INT1Ch vector and INT09h vector. De-initializes the ADM module.
AB	Prepare BBS for Int 19 boot.
AC	End of POST initialization of chipset registers.
B1	Save system context for ACPI.
00	Passes control to OS Loader (typically INT19h).